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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 6, NUMBER 11
JUNE 1, 1973

W73-06501 -- W73-07150

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 6, NUMBER 11
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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1973.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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04 WATER QUANTITY MANAGEMENT AND CONTROL
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07 RESOURCES DATA
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

THE STRUCTURE AND PROPERTIES OF WATER AND AQUEOUS SOLUTIONS,
IBM Research Lab., San Jose, Calif.
J. A. Barker, and D. Henderson.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $0.50. Office of Saline Water Research and Development Progress Report No 773, February 1972. 41 p. OSW Contract 14-30-2657.

Descriptors: *Physicochemical properties, Liquids, *Water properties, *Water structure, *Aqueous solutions, *Monte Carlo method, *Molecular structure, Argon.
Identifiers: Potential functions, Quantum mechanical methods, Polar liquids.

To gain a deeper understanding of the properties of water, an attempt was made to apply to water and aqueous solutions fundamental theoretical methods. This includes Monte Carlo calculations for liquid argon, Monte Carlo calculations for water, development of new potential functions for interaction of water molecules, development of a new Monte Carlo method for polar liquids including water, study of a quantum mechanical Monte Carlo methods and theoretical studies of solutions using several approaches. (OSW)
W73-07020

OPTICAL CONSTANTS OF WATER IN THE INFRARED,
Kansas State Univ., Manhattan.
For primary bibliographic entry see Field 02K.
W73-07027

02. WATER CYCLE

2A. General

RAINFALL-RUNOFF DATA FROM SMALL WATERSHEDS IN COLORADO, JUNE 1968 THROUGH SEPTEMBER 1971,
Geological Survey, Denver, Colo.
G. L. Ducret, Jr., and H. E. Hodges.
Colorado Water Resources Basic-Data Release No 27, 1972. 301 p, 2 fig, 2 tab, 12 ref.

Descriptors: *Rainfall-runoff relationships, *Basic data collections, *Hydrologic data, *Small watersheds, *Colorado, Streamflow, Gaging stations, Discharge measurement, Rain gages, Engineering structures, Planning, Storms, Storm drains, Urban hydrology, Urban runoff, Road construction, Watershed management.

The magnitude and frequency of peak discharges must be considered in the design of storm-drainage systems or structures. The U.S. Geological Survey, in cooperation with the Urban Drainage and Flood Control District and the Colorado Department of Highways, is conducting studies in which rainfall-runoff data are being collected and analyzed for the purpose of defining the flood characteristics of small watersheds. A network was designed to provide continuous records of rainfall and runoff from 30 urban stations in the Denver metropolitan area and 43 highway stations in eastern and southwestern Colorado. Rainfall data consist of a computer printout showing a tabulation of 5-minute incremental precipitation during the storm that produced the runoff event. The tabulation of precipitation intervals does not begin until the precipitacon in a 5-minute interval exceeds 0.015 inch. A computer program uses the stage-discharge relation at a gage to convert the punched stage data into a printout of gage height and discharge versus time. (Woodard-USGS)
W73-06736

SINGLE AND MULTI-SITE OPERATIONAL HYDROLOGY,
Monash Univ., Clayton (Australia).
T. A. McMahon, G. P. Codner, and C. Philips.
Nordic Hydrology, Vol 3, No 4, p 214-238, 1972. 8 fig, 7 tab, 26 ref.

Descriptors: *Statistical methods, *Simulation analysis, *Statistics, *Operations research, Statistical models Mathematical models, Mathematical studies, Distribution patterns, Time series analysis, Synthetic hydrology, Frequency analysis, Markov processes, Stochastic processes.
Identifiers: *Operational hydrology.

Time series techniques, both single site and multisite, including correlograms and spectral analyses, were studied to determine whether a lag-one Markov model will satisfactorily represent historical data. All models were tested using the streams of the Melbourne water supply system. All models except the three-parameter log normal generate sequences that closely resemble the historical sequences in terms of monthly and non-seasonal means and standard deviations. No model adquately simulated skewness. The skewed log data model generates monthly serial correlation estimates closer to the historical values than those generated by the other models. The gamma and empirical models produce near constant values. All models preserve monthly means and standard deviations. The two- and three-parameter log normal models reproduce the seasonal variation of skew. A feature of the gamma model is the low value of generated monthly skews. All models preserve the historical lag zero and lag-one cross correlations between sites. A feature of the multisite models is that they all produce high storage estimates. (Knapp-USGS)
W73-06817

REPRESENTATIVE AND EXPERIMENTAL CATCHMENTS AND MATHEMATICAL MODELS APPLIED IN HYDROLOGY (TAJJEL-LEMZO ES KISERLETI VIZGYUJTOK ES A HIDROLOGIABAN ALKALMAZOTT MATEMATIKAI MODELLEK),
R. P. Ibbit, and G. Kienitz.
Vizugyi Kozlemenyek, No 2, p 180-190, 1972. 1 fig, 3 tab. English summary.

Descriptors: *Model studies, *Mathematical models, *Hydraulic models, Rainfall-runoff relationships, Probability, Reviews, Stochastic processes, Simulation analysis.
Identifiers: *Hungary.

The IHD Hungarian Working Group on Experimental and Representative Catchments discussed the suggested international exchange of standard records for promoting research on the potential applications of mathematical models in hydrology. The system of classification proposed was accepted, but instead of the 'physical' term the designation 'actual model' was given preference. An attempt was made to make the separation of stochastic and deterministic models even more exact. Stochastic models yield long range forecasts of processes involving probability elements and therefore include distribution analysis. Deterministic models provide forecast on anticipated results of processes already developed, using measured physical parameters; therefore they include value analysis. The error formulae proposed should be applicable only to observed and estimated hydrographs superimposed at their centers of gravity. (Knapp-USGS)
W73-06842

FACTORS AFFECTING FLOODS FROM SMALL AND LARGE WATERSHEDS,
Hale and Kullgren, Akron, Ohio.
For primary bibliographic entry see Field 02E.
W73-06946

COMPUTER MODELING OF A CONIFEROUS FOREST WATERSHED,
Utah Water Research Lab., Logan.
G. B. Shih, R. R. Hawkins, and M. D. Chambers.
Proc. available from American Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017. Price $10.00. In: Age of Changing Priorities for Land and Water, Proceedings of Irrigation and Drainage Division Specialty Conference, Sept 26-28, 1972, Spokane, Wash: New York, N.Y., American Society of Civil Engineers, p 433-452, 1972. 1 tab, 18 ref.

Descriptors: *Mathematical models, *Forests, *Oregon, Water balance, Water yield, Rainfall-runoff relationships, Evapotranspiration, Snowpacks, Snowmelt.

A mathematical model is being developed and tested for subwatershed 2 of the H.J. Andrews Experimental Forest in the Cascade Mountains of central Oregon. The watershed has an area of 603 ha, with elevations from 525 to 1,005 meters. The annual precipitation is 2,150 mm., with relatively little snow, and streamflow is about 1,450 mm. The vegetation is a heavy stand of old growth Douglas-fir (100 to 500 years old) with mixed varying amounts of western hemlock and thick understory of secondary vegetation. Soils are deep, well-developed and porous, and the average slope is a steep 61%. Streamflow is highly variable and responsive to precipitation, but has never been zero. The steep slopes and the well-constructed streamflow measuring station led to the assumption of a tight watershed, with no groundwater inflow and outflow. Because of the small area, the model was lumped for initial work, and a time increment of one day is used. The model is contrained by continuity considerations. Output from the model matches output from the watershed reasonably well. (Knapp-USGS)
W73-06948

STOCHASTIC HYDROLOGY,
Grumman Aerospace Corp., Bethpage, N.Y.
R. L. Erath.
Available from NTIS, Springfield, Va 22151, AD-747 358; Price $3.00 printed copy; 95 cents microfiche. Grumman Research Department Memorandum RM-550, August 1972. 29 p, 7 fig, 4 ref.

Descriptors: *Hydrology, *Hydrologic systems, *Systems analysis, *Time series analysis, *Computer models, Mathematical studies, Stochastic processes, Hydrologic data, Hydrologic cycle, Input-output analysis, Forecasting, Streamflow, Groundwater movement, Water quality.
Identifiers: Coherence function.

The study of the information content of Hydrologic data requires an understanding of both the physics of the hydrologic system and the data analysis methods available. The increased sophistication of digital computers makes it possible to use the more advanced tools of data analysis that have been developed by mathematicians. Time series analysis in hydrology is of value in defining the sources of the variables in the hydrologic cycle. Better definitions of the interactions between various geophysical processes of the hydrologic cycle should enable the hydrologist to put together more realistic mathematical models of greater utility. In an example, it is shown how the concept of coherence can be used to remove many of the ambiguities that arise when the sources of noise are traced via spectrum analysis alone. The key element is the use of cross power spectrum to test the phase coherence of the sources. (Woodard-USGS)

W73-06950

AN EXPERIMENTAL STUDY OF THE APPLICATION OF KINEMATIC-WAVE THEORY TO OVERLAND FLOW,
Melbourne Univ., Parkville (Australia). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 02E.
W73-07045

ESTIMATING STREAMFLOW USING THORNTHWAITE'S CLIMATIC WATER--BALANCE,
Hull Univ. (England).
R. C. Ward.
Weather, Vol 27, No 2, p 73-84, February 1972, 4 fig, 1 tab, 16 ref.

Descriptors: *Streamflow, *Water balance, *Climatology, *Streamflow forecasting, *Hydrologic budget, Precipitation (Atmospheric), Watershed management, Hydrology, Computer models, Evapotranspiration, Measurement, On-site data collections, Mathematical models, Stream gages, Time-series analysis, Climatic data.

Since the development of the climatic water-balance by Thornthwaite and his co-workers many more sophisticated and more mathematical attempts have been make to develop catchment models which will generate streamflow from climatic data. In some of these the greater sophistication is justified by the improved ability of the model to generalize and by its ability to generate daily or even shorter-term streamflow data. However, the simple Thornthwaite model could hardly have yielded worse results in many of the cases where more sophisticated techniques have been adopted. This study was designed to examine the extent to which streamflow may be successfully modelled using the Thornthwaite method. Data for three contrasting time intervals (i.e., monthly, 10-day, and daily) over a period of four consecutive water-years (October 1966 to September 1970) have been utilized. The climatic water-balance permits the simple differentiation between 1) areas where more rain falls than the vegetation can use and where, as a result, there is a surplus of water which will be available for streamflow, (2) areas where there is less rainfall than the vegetation could use, and where, as a result, there is no water surplus and no permanent streams, and (3) the intermediate areas where there may be a water surplus in one season and water deficit in another. Streamflow data for the three time intervals indicate that the Thornthwaite climatic water-balance is a potentially useful tool for modelling streamflow from a small, fairly homogeneous clay catchment and that it compares well with other more sophisticated techniques. (Black-Arizona)
W73-07120

EVALUATION OF A BASIN-WIDE STOCHASTIC MODEL FOR EPHEMERAL RUNOFF FROM SEMIARID WATERSHEDS,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
L. J. Lane, and K. G. Renard.
Transactions of the ASAE America Society of Agricultural Engineers, Vol 15, No 2, p 280-283. 1972. 5 fig, 3 tab, 10 ref.

Descriptors: *Synthetic hydrology, *Stochastic processes, *Rainfall-runoff relationships, *Mathematical studies, Statistical models, Evaluation, Arid lands, Arizona, Southwest U.S., Watershed management, Hydrologic data, Synthesis, Statistics, Sampling, Seasonal.
Identifiers: Random variables.

Synthetic hydrology techniques permit a long series of hydrologic events to be generated using statistical parameters evaluated from a short sample. A problem from such methods occurs because sampling errors are preserved in the synthetic data and unrealistic design may result. This uncertainty can be partly overcome by generating several sequences of synthetic data and comparing the results to obtain a range of answers. The model used in this evaluation contains five statistical distributions to generate individual flow which, in turn, are added to provide annual data. Methods are presented for the analysis and comparison of actual synthetic streamflow from semiarid watersheds. The frequency of occurrence of independent runoff events defines a summer runoff season. Synthetic data generation based on the concept of a runoff season enables comparison of actual and synthetic data both on an event and on an annual basis. These comparisons indicate that the proposed model generates data that compare favorably with the actual data except for one parameter. The length of the summer runoff season is too variable in the synthetic data, although the mean values correspond. Adoption of a different distribution for the number of events per season may result in a less variable season length. (Black-Arizona)
W73-07147

2B. Precipitation

HUMIDITY AND TEMPERATURE MICROSTRUCTURE NEAR THE GROUND,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
H. C. Martin.
Quarterly Journal of the Royal Meterological Society, Vol 98, p 440-446, 1972. 3 fig, 3 tab, 15 ref.

Descriptors: *Climatology, *Temperature, *Humidity, *Heat transfer, Latent heat, Energy conversion, Wind velocity, Solar radiation, Stability, Turbulence.
Identifiers: Sensible heat.

Day-time records of the microstructure of humidity and temperature at 2 and 4 m are analyzed. Supporting data include the temperature and wind gradients, the net radiation, the sensible heat flux, and a derived value for the latent heat flux. The two variables are remarkably similar and share the following properties: The characteristic scale of turbulence increases with height and decreases with increasing instability beyond near-neutral conditions. The logarithmic spectra follow a -5/3 slope for wave numbers greater than 0.15/m. In this range, the spectral estimates increase with increases in the appropriate flux (sensible or latent heat flux for temperature or humidity spectra), and decrease with height. (Oleszkiewicz-Vanderbilt)
W73-06686

STATISTICAL INTERPRETATION OF HYDROMETEOROLOGICAL EXTREME VALUES,
For primary bibliographic entry see Field 07C.
W73-06816

AREAL RAINFALL EVALUATION USING TWO SURFACE FITTING TECHNIQUES,
Imperial Coll. of Science and Technology, London (England). Dept. of Civil Engineering.
E. M. Shaw, and P. P. Lynn.
Hydrological Sciences Bulletin (IAHS), Vol 17, No 4, p 419-433, December 1972. 4 fig, 6 tab, 15 ref.

Descriptors: *Ishohyets, *Statistical methods, *Mathematical studies, *Distribution patterns, *Rainfall, Rainfall disposition, Probability, Statistics.
Identifiers: *Trend surface analysis, *Multiquadric analysis.

Two trend surface fitting techniques (bicubic splines and multiquadric analysis) were applied to the determination of areal rainfall. On two mathematically defined test surfaces, the methods were applied using gridded data; bicubic splines gave the better results. For nongridded data, selected and random points, multiquadric analysis gives satisfactory values. With real catchment and storm data, multiquadric analysis is potentially a very useful and flexible method for determining areal rainfall. (Knapp-USGS)
W73-06830

AN ESTIMATE OF THE ROLE OF LAKE EFFECT SNOWSTORMS IN THE HYDROLOGY OF THE LAKE ERIE BASIN,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 02C.
W73-06978

SOME METEOROLOGICAL ASPECTS OF THE SEASONAL DISTRIBUTION OF PRECIPITATION IN THE WESTERN UNITED STATES AND BAJA, CALIFORNIA,
California Univ., Los Angeles. Dept. of Meteorology.
C. B. Pyke.
California Water Resources Center, Davis, Contribution No 139, UCLA-WRC-W-254, October, 1972. 205 p, 29 fig, 3 tab, 275 ref. OWRR A-021-CAL (4).

Descriptors: *Meteorology, *Precipitation (Atmospheric), *Meteorological data, *Hydrologic data, Data collections, Seasonal, Distribution patterns, Rainfall, Water temperature, Pacific Ocean, Storms, Tropical cyclones, *Southwest U.S.
Identifiers: *Baja California (Mexico).

The mean seasonal distribution of precipitation in the western United States and Baja California is examined and related to some of the climatic patterns of the sea surface temperature field and the tropospheric pressure-height and wind fields. The late fall and winter precipitation regime--the most prominent within the region of investigation--is associated with extratropical Pacific cylones; and its general seasonal southward progression results from a number of factors: (1) the southward displacement of the polar jet stream from early fall to the latter part of winter, (2) seasonal variations of land and ocean surface temperatures, (3) seasonal differences in the prevailing Pacific cyclone trajectories, (4) the seasonal change from proportionally greater warm-frontal precipitation during late fall to more cold-frontal and post-frontal precipitation in early spring, (5) an increase in intensity of the subtropical jet stream across Baja California from late fall to early spring--a phenomenon which perhaps results from seasonal fluctuations in the equatorial Pacific Ocean temperatures. Aside from the seasonal oscillation of the sun's declination, the Pacific Ocean surface temperatures are probably the most important source of influence upon the precipitation patterns of the region of investigation. (Woodard-USGS)
W73-06989

CLOUD PHOTOGRAPHS FROM SATELLITES AS A HYDROLOGICAL TOOL IN REMOTE EQUATORIAL REGIONS,
Wisconsin Univ., Madison. Dept. of Meteorology.
For primary bibliographic entry see Field 07B.
W73-07046

DEPTH-AREA RELATIONSHIPS FOR THUNDERSTORM RAINFALL IN SOUTHEASTERN ARIZONA,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
H. B. Osborn, and L. J. Lane.

Transactions of the ASAE, American Society of Agricultural Engineers, Vol 15, No 4, p 670-673, 680. JulyeAugust 1972. 7 fig, 11 ref.

Descriptors: *Depth-area curves, *Synoptic analysis, *Thunderstorms, *Rainfall-runoff relationships, Arizona, Climatology, Precipitation (Atmospheric), Southwest U.S., Watershed management, Hydrology, Agricultural engineering, Arid lands, Rain gages, Networks, Equations, Design flood, Rainfall intensity.
Identifiers: Walnut Gulch Experimental Watershed.

Depth-area rainfall relationships are of continuing interest to hydrologists and engineers, particularly in the Southwest where nearly all surface runoff from small arid and semiarid rangeland drainage areas (100 square miles and less) occurs from high-intensity thunderstorm rainfall. In this study, data from a dense network of recording rain gages in southeastern Arizona are used to describe, quantitatively, thunderstorm rainfall with depth-area equations, and these equations are compared to those from the earlier models. Rainfall statistics from 34 thunderstorms on the Walnut Gulch Experimental Watershed have provided data for determining a convective storm model. Three other thunderstorm rainfall models are compared with that developed from the Walnut Gulch data. Depth-area curves, which should be valuable for design floods, are compared for maximum point rainfalls of 2.0 and 4.2 inches. Results suggest that air-mass thunderstorm rainfall should be analyzed separately from frontal and frontal-convective rainfall and that models of thunderstorm rainfall should be separated into more than one category. (Black-Arizona)
W73-07129

2C. Snow, Ice, and Frost

EFFECT OF FREEZE-THAW CYCLES ON AGGREGATE STABILITY AND HYDRAULIC CONDUCTIVITY OF THREE SOIL AGGREGATE SIZES,
Agricultural Research Service, Burlington, VT. New England Watershed Research Center.
For primary bibliographic entry see Field 02G.
W73-06727

POTENTIAL EVAPOTRANSPIRATION AND WATER BALANCE IN ICELAND,
Icelandic Meteorological Office, Reykjavik.
For primary bibliographic entry see Field 02D.
W73-06815

ON DETERMINING THE MELTED WATER CONTENT OF SNOW BY DIELECTRIC MEASUREMENTS,
Innsbruck Univ. (Austria). Dept. of Physics.
W. Ambach.
Trans. available from NTIS, Springfield, Va., 22151 as AD-747 943, Price $3.00 printed copy; $0.95 microfiche. Army Cold Regions Research and Engineering Laboratory Draft Translation Report 354, June 1972. 7 p, 3 fig, 1 tab, 7 ref. (Trans from Zeitschrift fur Gletscheikunde und Glazialgeologie, Vol 4, No 1-2, p 1-8, 1958).

Descriptors: *Snow cover, *Water equivalent, *Melt water, *Ice, Analytical techniques, Electric currents, Resistivity, Measurement, Data collections.

By measuring the capacity of a plate condenser filled with a mixture of snow and water, the water content of the mixture can be determined. Capacity is measured with a bridge in which the condenser to be measured is substituted. The condenser's plates are sealed in plexiglas to insulate them for direct current. The experiments showed the capacity, and the loss (phase) angle to be a function of frequency in the range of 1,000 to 100,000 Hz. To date, measurements indicate a linear increase in capacity by approximately 30 pf (picofarads) for a 1% by volume increase in water content. Original capacity of dry snow was 50 pf. (Woodard-USGS)
W73-06818

CURRENT RESEARCH IN BRITISH SNOW-MELT RIVER FLOODING,
Newcastle-upon-Tyne Univ. (England).
For primary bibliographic entry see Field 02E.
W73-06831

MANUAL FOR THE STUDY OF THE PROPERTIES OF ICE,
B. A. Savelev.
Available from NTIS, Springfield, Va 22151, AD-741 870 Price $16.50 printed copy; 95 cents microfiche. Army Cold Regions Research and Engineering Laboratory Draft Translation 343, April 1972. 249 p, 70 fig, 15 tab, 51 ref. (Rukovodstvo Po Izvcheniv Svoistv L'Da, Moscow University, Publishing House, 1963).

Descriptors: *Ice cover, *Snow surveys, *Methodology, Ice-brine systems, Density, Porosity, Gases, Thermal properties, Water equivalent, Melt water, Chemical analysis, Analytical techniques, Sampling, Core drilling, Hydrologic data, Data collections.
Identifiers: USSR.

Methods are presented for examining the structure, the chemical and physical composition, and the mechanical and thermal properties of ice and snow. The manual contains 7 chapters as follows: (1) methods for studying the structure of ice and snow; (2) salinity and brine in ice; (3) determining the percentage of liquid and solid phases in salt-water ice; (4) measuring the density and porosity of ice; (5) determining the gaseous composition of the air trapped in ice pores; (6) testing the strength of ice; and (7) methods of studying the thermal properties of ice. (Woodard-USGS)
W73-06949

ACOUSTIC PROPERTIES OF FROZEN OTTAWA SAND,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02G.
W73-06972

AN ESTIMATE OF THE ROLE OF LAKE EFFECT SNOWSTORMS IN THE HYDROLOGY OF THE LAKE ERIE BASIN,
Atmospheric Environment Service, Toronto (Ontario).
M. S. Webb, and D. W. Phillips.
Water Resources Research, Vol 9, No 1, p 103-117, February 1973. 10 fig, 5 tab, 20 ref.

Descriptors: *Snowfall, *Climatology, *Lake Erie, Great Lakes, Great Lakes region, Meteorology, Lakes, Water balance, Precipitation (Atmospheric), Storms.
Identifiers: Lake effect snowstorms.

The role of lake effect snowstorms in the hydrology of the Lake Erie basin was estimated by using climatological data. By comparing monthly snowfall over areas affected by lake effect storms off Lake Erie and Lake Huron/Georgian Bay with a nearby nonaffected area, it was possible to isolate the contribution from frontal storm systems (including their augmentation due to orography) and from lake effect storm activity. Lake effect storms contribute only 6% of the mean seasonal snowfall over the entire basin. For the snow belt southeast of Lake Erie, lake effect snowstorms provided less than 20% of the total seasonal snowfall. This is low in comparision with other Great Lake snow belts because of the diminished storm activity resulting from the freezing over of Lake Erie by midwinter. The water equivalent of all snowfall over the Lake Erie basin isequivalent to a 1.07-foot depth over the Lake Erie area. Only 0.06 foot of this depth results from lake effect snowstorm activity. (Knapp-USGS)
W73-06978

WATER-RESOURCES RECONNAISSANCE OF ANAKTUVUK PASS, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 03B.
W73-07041

AN EARTH FILL DAM ON PERMAFROST, HESS CREEK DAM, LIVENGOOD, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 08D.
W73-07111

TECHNOLOGY ASSESSMENT OF WINTER OROGRAPHIC SNOWPACK AUGMENTATION IN THE UPPER COLORADO RIVER BASIN--THE IMPACTS OF SNOW ENHANCEMENT: VOLUME I. SUMMARY REPORT,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 03B.
W73-07149

TECHNOLOGY ASSESSMENT OF WINTER OROGRAPHIC SNOWPACK AUGMENTATION IN THE UPPER COLORADO RIVER BASIN--THE IMPACTS OF SNOW ENHANCEMENT: VOLUME II: TECHNICAL REPORT,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 03B.
W73-07150

2D. Evaporation and Transpiration

UNDERSTANDING AND IMPROVING THE SOIL-PLANT ENVIRONMENT FOR MORE EFFICIENT UTILIZATION OF WATER,
South Dakota State Univ., Brookings. Water Resources Research Inst.
For primary bibliographic entry see Field 03F.
W73-06518

POTENTIAL EVAPOTRANSPIRATION AND WATER BALANCE IN ICELAND,
Icelandic Meteorological Office, Reykjavik.
M. A. Einarsson.
Nordic Hydrology, Vol 3, No 4, p 183-198, 1972. 6 fig, 1 tab, 10 ref.

Descriptors: *Evapotranspiration, *Water balance, Precipitation (Atmospheric), Humidity, Evaporation, Solar radiation, Temperature, Winds, Mapping, Distribution patterns.
Identifiers: *Iceland, Potential evapotranspiration.

Potential evapotranspiration was estimated in Iceland using Penman's equation. The calculations are based on distribution maps for global radiation for the period 1958-1967 and meteorological data from 28 weather stations for the same period. The distribution of potential evapotranspiration for the year and for the summer (April-September) are mapped. Further, the difference between precipitation and potential evapotranspiration is calculated and mapped for the year as a whole and for the two periods April-September and May-August for the years 1931-1960. (Knapp-USGS)
W73-06815

CONTROLLING THE SOIL MOISTURE ENVIRONMENT OF TRANSPIRING PLANTS,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
C. T. Haan, and B. J. Barfield.
Plant and Soil, Vol 35, p 439-443, 1971. 3 fig, 3 ref. OWRR A-017-KY (2).

Descriptors: *Soil environment, *Control, *Soil moisture, *Transpiration, *Unsaturated flow, *Water utilization, Laboratory tests, Analytical techniques, Plant physiology, Environmental control, Microenvironment, Soil-water-plant relationships, Transpiration control, Hydrology, Consumptive use, Moisture uptake.

In conjunction with some studies on the effect of soil moisture potential on evapotranspiration, a method for controlling the soil moisture at constant levels was developed. A single plant is used in a soil cell where constant water potential is maintained at the interface between the soil and the porous media. The design variables are the distance of the water level below the soil and the relationships between water content, moisture potential, and conductivity of the porous media. The moisture content in the soil surrounding the plant roots is assumed to be uniform. The water level in the porous media is controlled by a bubble-tube arrangement which is adjustable to permit raising or lowering of the water level in the porous media, using the principles of unsaturated flow to arrive at values for the design variables and thus enabling control of the soil moisture potential at a constant level as long as the transpiration rate of the plant is constant. If the transpiration rate varies, the maximum possible fluctuation in the soil moisture content can be determined. (Black-Arizona)
W73-06866

RADIATIVE TEMPERATURES IN THE WILLAMETTE VALLEY,
Oregon State Univ., Corvallis. School of Forestry.
For primary bibliographic entry see Field 07B.
W73-07031

EVAPORATION OF WATER FROM SAND, 1: EXPERIMENTAL SET-UP AND CLIMATIC INFLUENCES,
National Inst. for Water Research, Windhoek (South-West Africa). Regional Lab.
D. H. R. Hellwig.
Journal of Hydrology, Vol 18, No 2, p 93-108, February 1973. 8 fig, 9 tab, 7 ref.

Descriptors: *Evaporation, *Alluvial channels, *Alluvial aquifers, *Evaporimeters, *Climates, Water loss, Humidity, Soil water, Sands, Underflow, Surface-groundwater relationships, Water temperature, Diurnal.

The influence of climate on rate of evaporation from sand was studied in South African alluvial channels. Solar radiation is the principal factor affecting evaporation. Air temperature affects evaporation only indirectly. Both rate of evaporation and air temperature result from the energy supplied by solar radiation. The effect of the relative humidity is far outweighed by other climatic factors. At times wind had a marked effect on evaporation. Under the conditions prevailing at the test site, climatic factors complemented each other in changes of evaporation. The temperature of the water at the water table did not appear to be an important factor; it influenced evaporation indirectly by conveying radiation energy and was in itself affected by evaporation. (Knapp-USGS)
W73-07055

EVAPORATION OF WATER FROM SAND, 2: DIURNAL VARIATIONS,
National Inst. for Water Research, Windhoek (South-West Africa). Regional Lab.
D. H. R. Hellwig.
Journal of Hydrology, Vol 18, No 2, p 109-118, February 1973. 5 fig, 2 tab, 17 ref.

Descriptors: *Evaporation, *Alluvial channels, *Alluvial aquifers, *Evaporimeters, *Climates, Water loss, Humidity, Soil water, Sands, Underflow, Surface-groundwater relationships, Water temperature, Diurnal.

In evaporation tests with moist sand, an evaporation peak was observed just before sunrise. Neither the vapor pressure gradient between water table and atmosphere, nor the fact that the vapor pressure difference between water table and atmosphere exceeded the vapor pressure deficit of the air during the night, could fully explain this phenomenon. The temperature difference between that of the water table and that of the atmosphere correlated well with evaporation during the night and seemed to be a determining factor during that period. (See also W73-07055) (Knapp-USGS)
W73-07056

THE EFFECT OF CONTAINER POROSITY ON ROOT ENVIRONMENT AND PLANT GROWTH. II. WATER RELATIONS,
Agricultural Research Council, Littlehampton (England). Glasshouse Crops Research Inst.
A. C. Bunt, and Z. J. Kulwiec.
Plant and Soil, Vol 35, p 1-16, 1971. 5 fig, 7 tab, 13 ref.

Descriptors: *Porosity, *Evapotranspiration control, *Water utilization, *Planting management, Plant growth, Moisture stress, Moisture availability, Seasonal, Water loss, Regime, Water conservation, Porous media.

Conventional plant containers made from fired clay are porous; those made from thermo-plastics are non-porous. Plants grown in containers have been found to be more sensitive to water stress than those grown in borders, and as plastic containers do not lose water by evaporation through the walls, a larger quantity of water is available for plant growth. The lack of porosity could therefore affect plant growth by reducing the matric stress. The effect of container porosity on water relations in the substrate and on plant growth was examined. With clay containers, the proportional effect of the wall on water loss varied with season, being responsible for 42 percent of the total loss in winter and 25 percent in summer. Water loss from plastic containers was 55 percent of that from clay containers in winter, and 66 percent in summer. Wall porosity also had a significant effect on water distribution within the container under high radiation conditions. Tomato plants grown under three water regimes showed no effect of matrix stress in winter, but growth was significantly reduced for each increase in stress in summer. There was no interaction between container type and water stress. Non-porous containers gave a higher water-use efficiency and had a lower irrigation requirement than porous ones, their greatest advantage being under conditions of low transpirational loss and high evaporative loss. (Black-Arizona)
W73-07124

NITROGEN FERTILIZATION AND CLIPPING EFFECTS ON GREEN NEEDLEGRASS (STIPA VIRIDULA TRIN.):II EVAPOTRANSPIRATION, WATER USE EFFICIENCY, AND NITROGEN RECOVERY,
Montana State Univ., Bozeman. Dept. of Agronomy.
L. M. White, and J. H. Brown.
Agronomy Journal, Vol 64, No 4, p 487-490. July-August 1972, 3 fig, 4 tab, 17 ref.

Descriptors: *Forage grasses, *Fertilizers, *Evapotranspiration, *Water utilization, *Plant growth regulators, Efficiencies, Consumptive use, Soil-water-plant relationships, Distribution patterns, Soil water, Nitrate, Nitrogen compounds, Nitrogen, Soil chemical properties, Limiting factors, Great Plains, Semiarid climates, Crop production, Grasslands, Dry farming, Moisture stress, Wilting.
Identifiers: *Clipping, *Green Needlegrass, *Nitrogen recovery.

Soil water and nitrogen (N) are the major factors limiting forage production in the semiarid Great Plains grasslands. Effects of N fertilization and clipping of dryland green needlegrass upon evapotranspiration (ET), water-use efficiency (WUE) and N fertilizer recovery are reported. N was broadcast at 0.70 and 140 kg of N/ha in November 1968; Green needlegrass (Stipa viridula Trin.) was either left unclipped or clipped to a 5-cm height five times during 1969 at 21-day intervals. Needlegrass showed visual signs of water stress when water was deficient in the surface 30 cm of soil. On unclipped plots, 80 per cent of the ET was from this depth. WUE of unclipped grass increased during May and June and decreased during July, but that of clipped plants decreased from May through July. N fertilization increased and clipping decreased WUE. Average N recoveries with higher application rates were 22 percent for the first year and 8 per cent for the second. N recovery was highest with 70 kg of N/ha and frequent clipping. Low N recovery was not due to leaching. At the end of the first crop season, 7 per cent of the 70 kg N/ha applied and 17 per cent of the 140 kg of N/ha applied the previous year remained in the soil as nitrate-N. Soil water in the 0 to 30-cm soil depth controlled grass wilting. (Popkin-Arizona)
W73-07128

THE EDDY-CORRELATION TECHNIQUE OF EVAPORATION MEASUREMENT USING A SENSITIZED QUARTZ-CRYSTAL HYGROMETER,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Meteorological Physics.
B. B. Hicks, and H. S. Goodman.

Descriptors: *Evaporation, *Measurement, *Hygrometry, *Water loss, Evaporation control, Water balance, Water vapor, Methodology, Energy budget, Air-earth interfaces, Humidity, On-site tests.
Identifiers: *Eddy-correlation technique, Bowen ratio.

A system is described for the measurement of the atmospheric flux of water vapor near the surface, using a quartz-crystal oscillator as humidity sensor based on the Fluxatron technique. The system has the benefits of electronic simplicity and ease of operation in the field. However, it is subject to contamination by airborne particles (as is typical with other sensor types), and must be protected from the rain. Also, the interpretation of the results obtained when it is operated as an Eddy-correlation sensor depends upon the availability of a sufficiently accurate measure of the sensible heat flux. Its ease of operation exceeds that of a conventional fast-response wet bulb when used with equipment such as the Fluxatron where values of H are normally obtained, and the results are probably more accurate. Results from a field test give an energy balance recovery ratio (LE+H)/ (R-G)±1.00 plus or minus 0.04. (Black-Arizona)
W73-07130

SPRINKLER WATER DISTRIBUTION TESTING IN A DESERT ENVIRONMENT,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 03F.
W73-07137

SOME COUNTERACTIVE EFFECTS OF ANTITRANSPIRANTS,
California Univ., Davis. Dept. of Water Science and Engineering.
D. C. Davenport, M. A. Fisher, and R. M. Hagan.
Plant Physiology, Vol 49, p 722-724, 1972. 1 fig, 2 tab, 15 ref.

Descriptors: *Plant growth regulators, *Antitranspirants, *Stomata, *Inhibitors, *Transpiration control, Plant growth, Photosynthesis, Phenology, Foliar application, Metabolism, Surfactants, Thin films, Water yield improvement, Plant physiology, Chemcontrol, Water loss, Water conservation.

Two major groups of antitranspirants are those that act (1) by forming a film on the leaf surface, and (2) by preventing complete stomatal opening. Some previously unexpected and seemingly contradictory effects of antitranspirants on stomata and plant growth are reported. The first deals with the effects of antitranspirant films on stomatal aperture. The second describes some of the effects of antitranspirants on plant growth. The third concerns the effect of the stomatal inhibitor, phenylmercuric acetate,of inhibiting complete stomatal closure. Antitranspirant films increase the resistance to diffusion of water vapor from stomata. This increases leaf water potential and results in wider stomatal apertures immediately under the film, as well as those parts of a partially treated leaf which are not covered by the film. Antitranspirants are expected to curtail growth via reduced photosynthesis. However, by increasing plant water potential they can enhance the growth of fruits and shoots. (Black-Arizona)
W73-07139

2E. Streamflow and Runoff

OPERATIONAL CHARACTERISTICS OF A NUMERICAL SOLUTION FOR THE SIMULATION OF OPEN CHANNEL FLOW,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources.
E. F. Wood, B. M. Harley, and F. E. Perkins.
Available from the National Technical Information Service as PB-217 861, $3.00 in paper copy, $0.95 in microfiche. Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Report No. 150, June 1972. 186 p, 46 fig, 4 tab, 9 ref, 1 append. OWRR C-1708 (3159) (1). 14-31-0001-3159.

Descriptors: *Flood routing, *Hydraulic transients, *Numerical analysis, *Computer models, Open channel flow, Routing, River systems, Networks, Computer programs, Simulation analysis, Model studies.
Identifiers: *Finite differences, *Finite elements.

The study investigates four interrelated areas. The first area is concerned with a review and a recalculation of the convergence properties for a simplified form of the St. Venant Equations. The second area consists of investigating a solution procedure which completely linearizes the implicit coefficient matrix about some reference depth and discharge. The validity of this approach is discussed. The third area of study develops a problem-oriented language (POL) input editor suitable for river-basin simulation and implemented on a time sharing system. The fourth area of study is the verification of the unit influence function method of solution for any generalized network of channels. Results from this scheme are applied to field data based on complex multilooped channel networks.
W73-06504

SURFACE CURRENT MEASUREMENTS BY EXPENDABLE PROBES,
Coast Guard, Washington, D.C., Office of Research and Development.
For primary bibliographic entry see Field 07B.
W73-06630

APPARENT HORIZONTAL DIFFUSION IN STRATIFIED VERTICAL SHEAR FLOW,
Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.
G. Kullenberg.
Tellus, Vol 24, No 1, p 17-28, 1972. 2 fig, 4 tab, 18 ref.

Descriptors: *Flow, *Shear, *Stratification, *Diffusion, Hydrodynamics, Currents (Water), Density, Viscosity, Salinity, Fluorometry, Temperature, Model studies, Wind velocity, Fjords, Coast.
Identifiers: Ekman current meter, Rhodamine-B.

An investigation of the horizontal turbulent diffusion in relation to environmental conditions, such as density stratification, vertical current shear, and current variability, is presented. Tracer experiments have been conducted in fjords, in coastal areas, and in offshore waters with a view to obtaining data for such a study. In addition, observations of wind velocity, salinity, temperature, and current have been carried out. A model is proposed assuming that the apparent horizontal diffusion is determined by the combined action of vertical diffusion and vertical current shear. The current field is interpreted as having a steady and a time-dependent part. The steady part includes all the components of motion so large that they only advect the dye spot. The time-dependent part includes all the smaller scales. The theoretical predictions are found to compare well with the experimental results. (Jerome-Vanderbilt)
W73-06700

PROPAGATION OF A NONSPHERICAL THERMAL WAVE,
Science Applications, Inc, La Jolla, Calif.
G. C. Pomraning.
Journal of Applied Physics, Vol 43, No 6, p 2722-2727, June, 1972. 2 fig, 14 ref. DASA-01-70-C-0140.

Descriptors: *Mathematical studies, *Heat transfer, *Diffusion, *Interfaces, Hydrodynamics, Thermodynamics, Mathematical models, Energy, Dispersion, Temperature, Theoretical analysis, Density, Waves, Thermal pollution.

A radiative diffusion problem which gives rise to a wave front with two-dimensional structure is considered. Particular emphasis is placed on the description of the wave front resulting from a point source of energy liberated instantaneously at the interface between two homogeneous half-spaces. By a combination of similarity and moments methods the problem is reduced to a second-order nonlinear ordinary differential equation describing the positions of the wave front. This equation is solved analytically in the almost spherical and highly nonspherical limits. Numerical results for the partition of energy between the two half-spaces are given. (Jerome-Vanderbilt)
W73-06702

ON THE ADVECTIVE AND DIFFUSIVE HEAT BALANCE IN THE INTERIOR OF A SUBTROPICAL OCEAN,
RAND Corp., Santa Monica, Calif.
R. C. Alexander.
Tellus, Vol 23, No 4-5, p 393-403, 1971. 6 fig, 2 tab, 11 ref.

Descriptors: *Diffusion, *Thermocline, *Oceans, *Mathematical models, Geophysics, Oceanography, Ocean circulation, Water circulation, Stratification, Model studies, Heat balance, Isotherms, *Advection, Wind, Heated water.
Identifiers: Baroclinic flow.

An exponential solution to the thermocline equations is scaled and calibrated for the intermediate circulation in middle latitudes of the open ocean in accordance with the scaling and results of the more complete numerical models of Bryan and Cox. Evaluation of the average potential vorticity for a number of stations is a main feature of the calibration method. The results of tests on the calibrated model in which the wind stress parameter E is varied show good qualitative agreement with the published numerical results. The effects of varying the vertical thermal diffusion parameter K are investigated. A significant feature of the results is the lack of appreciable difference in temperature distributions for the cases when $E \pm K \pm 1$ (the reference case) and $E \pm 1$, $K \pm 0$, (the purely advective case). It is shown that the dominant balance near the surface (but beneath the frictional layer) is between horizontal and vertical advection if the ratio $E/KC>1$, where C is the dimensionless thermocline scale parameter evaluated from the potential vorticity equation. For all values of the parameters it is shown that the ratio of horizontal advection to vertical diffusion is not less than one just beneath the surface layer in middle latitude regions of surface downwelling. (Jerome-Vanderbilt)
W73-06703

WATER RESOURCES AND GENERAL GEOLOGY OF GRANT COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
F. D. Trauger.
Available from New Mexico State Bureau of Mines, Socorro, N Mex 87801. Price $9.50. New Mexico State Bureau of Mines and Mineral Resources Hydrologic Report 2, 1972. 211 p, 50 fig, 15 tab, 56 ref.

Descriptors: *Water resources, *Geology, *Hydrologic data, *Water quality, *New Mexico, Groundwater resources, Surface waters, Water wells, Hydrogeology, Aquifers, Groundwater movement, Water yield, Groundwater recharge, Topography, Precipitation (Atmospheric), Water utilization, Water supp.y, Irrigation, Industries, Domestic water, Mining, Streamflow, Chemical analysis.
Identifiers: *Grant County (N Mex).

Water resources data for Grant County, N. Mex., include records of 1,724 wells, test holes, and shafts; 45 springs or spring groups; driller's logs of 60 wells; chemical analyses of 224 samples of ground and surface water; a summary of streamflow records; water-level records of selected wells; and geologic and hydrologic maps. Grant County, in southwestern New Mexico, has an area of 3,970 square miles. The northern part is mountainous with peaks of about 10,000 feet. The southern part has bolson plains and isolated block-fault mountain ranges. The San Vicente basin, which contains a large body of groundwater of good quality, is a northwestward extension of the bolson plains into the mountainous area. The principal cities are on the margins of this basin. The bolson deposits are 1,600 feet locally. Irrigation and industrial wells have yields ranging from 100 to 1,500 gpm. (Woodard-USGS)
W73-06718

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, GREEN CREEK, BRAZOS RIVER BASIN, TEXAS, 1955-66,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W73-06720

GENERALIZED STREAMFLOW RELATIONS OF THE SAN BERNARDINO AND EASTERN SAN GABRIEL MOUNTAINS, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 04A.
W73-06724

ESTIMATION OF 100-YEAR FLOOD MAGNITUDES AT UNGAGED SITES,
Geological Survey, Arlington, Va.
For primary bibliographic entry see Field 04A.
W73-06726

RAINFALL-RUNOFF DATA FROM SMALL WATERSHEDS IN COLORADO, JUNE 1968 THROUGH SEPTEMBER 1971,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02A.
W73-06736

CHANNEL CHANGES OF THE GILA RIVER IN SAFFORD VALLEY, ARIZONA, 1846-1970,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 08B.
W73-06737

PROBLEMS IN RIVER HYDROLOGY AND FLOW DYNAMICS (VOPROSY GIDROLOGII REK I DINAMIKI POTOKOV).
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 02J.
W73-06801

KINEMATIC STRUCTURE OF THE BOTTOM LAYER OF FLOW IN THE PRESENCE OF SURFACE WAVES (O KINEMATICHESKOY STRUKTURE PRIDONNOGO SLOYA POTOKA PRI NALICHII POVERKHNOSTNYKH VOLN),
For primary bibliographic entry see Field 02J.
W73-06806

SOME CALCULATIONS ON THE FREE OSCILLATIONS OF NON-ROTATING PARABOLIC BASINS,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 04A.
W73-06828

THE WATER RESOURCES OF THE RIO GRANDE DE TARCOLES BASIN, COSTA RICA,
World Meteorological Organization, San Jose (Costa Rica). Central American Hydrometeorological Project.
For primary bibliographic entry see Field 03B.
W73-06829

CURRENT RESEARCH IN BRITISH SNOWMELT RIVER FLOODING,
Newcastle-upon-Tyne Univ. (England).
P. Johnson, and D. R. Archer.
Hydrological Sciences Bulletin (IAHS), Vol 17, No 4, p 443-451, December 1972. 4 fig, 1 tab, 8 ref.

Descriptors: *Snowmelt, *Runoff forecasting, *Flood forecasting, Precipitation (Atmospheric), Rainfall, Water yield, Snow surveys, Snow cover, Correlation analysis.
Identifiers: *Degree-day method (Snowmelt).

An adaption of the degree-day method was used to analyze snowmelt events on two catchments as a first step in a program of research on snowmelt river flooding in Britain. The degree-day factor varies during events and between events on the same catchment. A snowmelt event consists of an initial lag phase, a phase of nearly constant degree-day factor, and a recession phase. The degree-day factor in the constant part of each event has significant correlation with the total flood volume on both catchments and with liquid precipitation during the snowmelt on one catchment only. Separate procedures are necessary for forecasting the initial lag phase and runoff during the recession. (Knapp-USGS)
W73-06831

FACTORS AFFECTING FLOODS FROM SMALL AND LARGE WATERSHEDS,
Hale and Kullgren, Akron, Ohio.
Y. Bar-Kochba, and A. L. Simon.
Proc. available from American Society of Civil Engineering 345 E. 47th St., New York, N.Y. 10017. Price $10.00. In: Age of Changing Priorities for Land and Water, Proceedings of Irrigation and Drainage Division Specialty Conference, Sept 26-28, 1972, Spokane, Wash: New York, N.Y., American Society of Civil Engineers, p 87-100, 1972. 3 fig, 3 tab, 12 ref.

Descriptors: *Floods, *Ohio, *Rainfall-runoff relationships, Correlation analysis, Small watersheds, Rainfall intensity, Infiltration, Slopes, Water storage, Reservoirs, Flood control, Flood forecasting, Flood frequency, Regression analysis.

Hydrologic factors affecting floods from small and large watersheds were studied in the humid region of northeastern Ohio. Statistical multiple correlation analysis was used to relate floods to hydrologic and basin characteristics. Results of emphasize that the characteristics of floods from small and large watersheds are so significantly different that the two problems cannot be combined into one solution. The most important hydrologic characteristics in large watersheds are drainage area size and main channel slope. For small watersheds the most important hydrologic characteristics are drainage area size, rainfall intensity, and soil index. The results provide a generalized method to predict and estimate floods at any site in the study region. (Knapp-USGS)
W73-06946

ATTENUATION OF WIND-GENERATED DEEP WATER WAVES BY VERTICAL JET BREAKWATERS,
Massachusetts Univ., Amherst. School of Engineering.
For primary bibliographic entry see Field 08B.
W73-06951

THEORETICAL FREQUENCY DISTRIBUTIONS FOR THE ANALYSIS OF PLAINS STREAMFLOW,
York Univ., Downsview (Ontario). Dept. of Geography.
E. S. Spence.
Canadian Journal of Earth Sciences, Vol 10, No 2, p 130-139, February 1973. 2 fig, 5 tab, 31 ref.

Descriptors: *Frequency analysis, *Water yield, *Streamflow, *Canada, Regression analysis, Time series analysis, Distribution patterns, Flood forecasting, Streamflow forecasting.
Identifiers: Normal distribution, Lognormal distribution, Gumbel distribution.

Several different frequency distributions are in common use in the frequency analysis of hydrologic events. Two 2-parameter frequency distributions, the Normal and the Lognormal, were tested for best fit in the frequency analysis of available annual yield data series. Four 2-parameter frequency distributions, the Normal, the Lognormal, the Gumbel, and the Log-Gumbel were tested in the frequency analysis of annual flood flow data series for 161 drainage basins in the Canadian Plains. The relative best fits were established by data transformation and subsequent linear correlation and regression analyses. The bases for comparison are the resulting correlation coefficients. Of the distributions tested, the two-parameter Lognormal distribution provides the best fit for the frequency analysis of both the annual yield and annual flood flow data series for plains basins. (Knapp-USGS)
W73-06959

APPROXIMATION OF HEAT EXCHANGE AT THE AIR-WATER INTERFACE,
Geological Survey, Washington, D.C. Water Resources Div.
H. Yotsukura, A. P. Jackman, and C. R. Faust.
Water Resources Research, Vol 9, No 1, p 118-128, February 1973. 4 fig, 7 tab, 10 ref.

Descriptors: *Heat transfer, *Air-water interfaces, *Water temperature, *Air temperature, Meteorology, Evaporation, Solar radiation, Mass transfer, Winds.

The basic exchange equations for air-water interface may be approximated by the Taylor series expansion around an undefined base temperature in order to calculate short-term heat exchanges. The expression short-term indicates averaging over a period on the order of 1 hour. Numerical tests based on data from two shallow streams verify that the base temperature should be chosen so as to minimize deviations between the base temperature and the actual water temperature. The daily average natural temperature observed at a reference point is the most practicable base. The daily equilibrium temperature calculated from meteorologic data may be used as a base as long as it does not deviate excessively from actual water temperatures. Whereas the short-term natural temperature is the most accurate base, the short-term equilibrium temperature has no merit as a base temperature of linearization. (Knapp-USGS)
W73-06977

A COMPARATIVE STUDY ON FLOOD ROUTING COMPUTATION,
Illinois Univ., Urbana. Dept. of Civil Engineering.
A. S. Sevuk, and B. C. Yen.
In: Proceedings of the International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand, Vol 3, p 275-290. 4 fig, 17 ref. OWRR-B-043-ILL (6). 14-31-0001-3078.

Descriptors: *Flood routing, *Hydraulics, *Non uniform flow, Open channels, *Mathematical models, Sewers, Streamflow, Surface runoff, Unsteady flow.
Identifiers: *St. Venant equations, Numerical computations.

The most commonly used flow equations in hydraulic flood routing are the St. Venant equations for which no explicit solution exists. Previously proposed computational techniques to obtain numerical solutions for the St. Venant equations can be categorized into the explicit finite difference schemes, implicit finite difference schemes, and method of characteristics. A comparative investigation has been made on the relative merits of these three schemes with respect to convergence and computational speed. Improved computational methods have been proposed for the latter two schemes with computer results plotted for comparison. Through numerical examples it is shown that a second order formulation of the method of characteristics and an implicit scheme canonical formulation of the characteristic equations are superior to other schemes.
W73-07026

ROTATING FLUID STUDIES WITH RELEVANCE TO GEOPHYSICS,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
T. S. Murty.
Manuscript Report Series No 25, 1972. 61 p, 3 fig, 5 tab, 24 ref, 4 append.

Descriptors: *Oceanography, *Ocean currents, *Rotational flow, *Tidal effects, *Gravity, Analytical techniques, Laboratory tests, Mathematical studies, Equations, Free surfaces, Flow characteristics, Correlation analysis.
Identifiers: *Earth rotation.

Fluid oscillations of the first class (O.F.C.) are those with nonzero finite frequencies in the limit of zero rotation while oscillations of the second class (O.S.C.) are those whose frequencies tend to zero in the limit of zero rotation, i.e., rotation is es-

sential for their very existence. In the oceanographic context these two types of oscillations are called tidal and inertial, respectively. Four topics are included under the appendix. Appendix 1 describes the theory and some numerical results for axisymmetric gravity modes in a rotating hemispherical basin. In appendix 2 theoretical calculations of Fultz, Murty and Platzman (1971) led to the numerical problem of determining the orders (generally nonintegral) of the Legendre functions. Appendix 3 describes an analytical evaluation of certain integrals involving Legendre functions and their derivatives which arise in theoretical studies on O.F.C. Appendix 4 gives detailed frequency measurements on O.F.C. in the laboratory using circular cylinders with flat and paraboloidal bottoms. Most of the results are for axisymmetric modes, but a few measurements on the rotationally split positive and negative azimuthal modes are also given. (Woodard-USGS)
W73-07033

CALIFORNIA STREAMFLOW CHARACTERISTICS (FROM RECORDS THROUGH 1968)--VOLUME 1: COLORADO RIVER BASIN, SOUTHERN GREAT BASIN, AND PACIFIC SLOPE BASINS, EXCLUDING CENTRAL VALLEY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 07C.
W73-07034

CALIFORNIA STREAMFLOW CHARACTERISTICS (FROM RECORDS THROUGH 1968)--VOLUME 2: NORTHERN GREAT BASIN AND CENTRAL VALLEY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 07C.
W73-07035

FLOODFLOW CHARACTERISTICS OF LITTLE CREEK AT STATE HIGHWAY 286, NEAR CONWAY, ARKANSAS,
Geological Survey, Little Rock, Ark.
J. L. Patterson, and J. N. Sullavan.
Geological Survey open-file report, May 1972. 7 p, 3 fig, 1 ref.

Descriptors: *Streamflow, *Floods, *Flow characteristics, *Backwater, *Arkansas, Water levels, Roadbanks, Highway effects, Roads, Engineering structures, Bridges, Environmental effects, Data collections.
Identifiers: *Little Creek (Ark), *Conway (Ark), Arkansas State Highway 286.

Arkansas State Highway 286 was improved and the roadway height increased approximately 4 feet near the bridge over Little Creek. The backwater elevation and flood duration for high-water conditions were determined before and after the roadway section was improved. Prior to raising the highway fill, the road was virtually at ground elevation and backwater, caused by the bridge and roadway, for the 50-year flood would have been insignificant. Under present conditions, for the 50-year flood, 1,900 cfs would pass the bridge, and 1,100 cfs would flow over the bridge and roadway. Backwater for the 50-year flood caused by the embankment would be 1.5 feet at the upstream side of the bridge, 0.8 foot 500 feet upstream, 0.4 foot 1,000 feet upstream, and an insignificant amount 1,500 feet upstream. (Woodard-USGS)
W73-07037

WATER RESOURCES OF THE JOBOS AREA, PUERTO RICO--A PRELIMINARY APPRAISAL, 1962,
Geological Survey of Puerto Rico, San Juan.
N. E. McClymonds, and J. R. Diaz.
Puerto Rico Water Resources Bulletin 13, 1972. 32 p, 21 fig, 6 tab, 9 ref.

Descriptors: *Water resources development, *Groundwater resources, *Surface waters, *Hydrologic data, *Puerto Rico, Aquifers, Aquifer characteristics, Water wells, Water yield, Streamflow, Groundwater recharge, Pumping, Water quality, Chemical analysis, Data collections, Rainfall, Runoff, Water level fluctuations.
Identifiers: *Jobos area (Puerto Rico).

In the Jobos area on the south coast of Puerto Rico, a 30-square mile belt of coalescing alluvial fans lies between the foothills to the north and the coastal plain to the south. Perennial streams from the foothills lose all their flow by percolation into the alluvial deposits except during floods. In an average year, recharge from streamflow is about 8,000 acre-feet; from irrigation canals, about 14,000 acre-feet; from rainfall, about 17,000 acre-feet; and from return flow from pumpage for irrigation, about 14,000 acre-feet. Of the total 211,000 acre-feet of water entering the area about 75% is evaporated and transpired; 25% is discharged to the Caribbean Sea, 39,000 acre-feet as streamflow and 13,000 acre-feet as goundwater discharge. Pumpage of about 40,000 acre-feet during years of average rainfall will probably not result in lowering the water table below sea level. Recharge from return flow of irrigation water is of considerable importance in maintaining the hydrologic balance of the aquifer system. (Woodard-USGS)
W73-07039

PROGRESS REPORT ON THE WATER RESOURCES INVESTIGATIONS OF DUVAL COUNTY DURING 1970,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 04B.
W73-07042

AN EXPERIMENTAL STUDY OF THE APPLICATION OF KINEMATIC-WAVE THEORY TO OVERLAND FLOW,
Melbourne Univ., Parkville (Australia). Dept. of Agricultural Engineering.
K. J. Langford, and A. K. Turner.
Journal of Hydrology, Vol 18, No 2, p 125-145, February 1973. 15 fig, 1 tab, 10 ref.

Descriptors: *Overland flow, *Waves (Water), *Simulation analysis, Unsteady flow, Kinematical models, Water storage, Hydrograph analysis, Roughness (Hydraulic), Recession curves, Hydraulic models, Rainfall-runoff relationships.
Identifiers: *Kinematic wave theory.

The accuracy of kinematic-wave theory as applied to overland flow over a rough, uneven surface was tested. Depression storage and the hydraulic roughness for flows without rain were measured in separate tests; hydraulic roughness for flows under rain was calculated from the rising limbs of the runoff hydrographs in a series of simulated storms. Recession curves were calculated using kinematic-wave theory. The close agreement between experimental and calculated recessions showed the accuracy of this theory in predicting the behavior of flows over rough uneven surfaces. Hysteresis was observed in the storage-discharge curves; this may also be explained in terms of kinematic-wave theory. (Knapp-USGS)
W73-07045

TRANSVERSE DIFFUSION OF SOLUTES IN NATURAL STREAMS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-07049

FINAL REPORT, MEASUREMENT OF FLOOD FLOW AND SUSPENDED SEDIMENTATION BY RADIOISOTOPE METHOD,
Taiwan Power Co., Taipei.
D. S. L. Chu, C-F. Pan, and I-L. Cheng.
Contract Report for International Atomic Energy Agency, November 1972. 36 p, 5 fig, 2 tab, 2 append. IAEA Contract 644/RB.

Descriptors: *Floods, *Streamflow, *Sediment transport, *Flow rates, Foreign countries, Analytical techniques, Discharge measurement, Instrumentation, Radioisotopes, Sediment yield, Hydrologic data, Data collections, Correlation analysis, Evaluation.
Identifiers: *Taiwan, *Republic of China.

In December 1968, research was initiated to investigate the possibility of introducing to Taiwan the isotope method in hydrometric measurements. Two subjects are separately discussed: Flood flow measurement by tritiated water; and Suspended-sediment measurement by the radioisotope method. Because of the torrential nature of the streams in Taiwan, conventional methods of flow measurement often confront difficulties in the field especially during the typhoon flood seasons. The tritium method of flow measurement was tested in flood stages as an alternative. Many experiments were made to confirm the adaptability of this method in Taiwan using a rating curve for a hydrometric station. The problems of sediment transportation have great influence on economic considerations in water and related land developments. Results are presented of the application of a portable radioisotope sediment gage, its adaptability and economic value. For the first experiment at Lushui on the Liwu River, sediment content was only 30 ppm by DH-48 sampler. There was no response to the detector, indicating that the gage is not useful at low sediment content. At Chichi on the Chu-shui River, sediment content was high enough to collect detector count above the background value, but the water velocity was rapid and the gage was very unstable in the water. The discrepancy of results between radioisotope sediment gage and conventional sampler was very large, probably due to both the unrepresentative calibration curve and the unstable gage in water. (Woodard-USGS)
W73-07051

LOW-FLOW INVESTIGATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-07052

ESTIMATING STREAMFLOW USING THORNTHWAITE'S CLIMATIC WATER--BALANCE,
Hull Univ. (England).
For primary bibliographic entry see Field 02A.
W73-07120

2F. Groundwater

PROPOSED WATER-RESOURCES STUDY FOR THE MADERA AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
W. R. Hotchkiss, and L. C. Dutcher.
Geological Survey open-file report, August 22, 1972. 38 p, 8 fig, 4 tab, 28 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifers, *Water quality, *California, Project planning, Reviews, Aquifer characteristics, Water levels, Mapping, Model studies, Hydrologic systems, Streams.
Identifiers: *San Joaquin Valley (Calif), *Madera area (Calif).

A proposed water-resources study of the Madera area, California, includes about 870 square miles of flat to rolling semiarid agricultural land lying in the east-central part of the San Joaquin Valley. The first data on developmentof water resources in the Madera area date from 1906. Infrequent water-level measurements initiated in 1906 and

more recent regular periodic measurements indicate declining groundwater levels in some areas and local rising groundwater levels in others. The quality of the groundwater has deteriorated in some areas. The bottom and eastern margin of the fresh-water aquifers west of the Sierra Nevada foothills comprise the base and the eastern boundary of the groundwater study basin. The San Joaquin River was chosen as the southern and western boundary of the basin because the river contributes to groundwater and is hydrologically stable. The Chowchilla River along the north geographic boundary of Madera County flows intermittently but is not a stable hydrologic boundary. Therefore, the northern hydrologic boundary of the basin was chosen along a line of small water-level change about 8 miles north of the Chowchilla River. Any groundwater basin model achievable would simulate the unconfined water body only and would be an intermediate step toward ultimately achieving an understanding of the hydrologic system. (Woodard-USGS)
W73-06716

WATER LEVELS AND ARTESIAN PRESSURES IN THE CHAD BASIN OF NORTHEASTERN NIGERIA, 1963-68,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-06717

WATER RESOURCES AND GENERAL GEOLOGY OF GRANT COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 02E.
W73-06718

GROUND WATER IN DICKENS AND KENT COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-06719

OCCURRENCE OF GROUND-WATER IN HARD ROCK FORMATIONS OF PAKISTAN,
Geological Survey of Pakistan, Quetta.
For primary bibliographic entry see Field 04B.
W73-05721

THE GEOLOGICAL STRUCTURE AS A GUIDE IN SEARCH FOR GROUND-WATER IN HIGHER REGION OF BALUCHISTAN,
Geological Survey of Pakistan, Quetta.
For primary bibliographic entry see Field 04B.
W73-06722

SALINE AND OFFSHORE GROUND WATER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
L. C. Dutcher, and R. S. Lord.
Proc. available from Univ. of Calif, Water Resources Center, Los Angeles, 90024, Price $3.00. In: Proceedings of 8th Biennial Conference on Groundwater, September 22-23, 1971, Davis, Calif: Los Angeles, California University Water Resources Center Report No 24, p 50-60, April 1972. 15 ref.

Descriptors: *Saline water systems, *Groundwater resources, *Water resources development, *California, Hydrogeology, Saline water intrusion, Encroachment, Water sources.
Identifiers: Offshore groundwater.

Consideration of supplies of available saline groundwater can influence optimum development programs. In California, huge reserves of naturally mineralized waters exist in widely dispersed aquifer systems. These reserves total several hundred million acre-feet of water. Salinated water due to the activities of man are also widespread and increasing in volume. In addition, large fresh or moderately saline reserves of groundwater are stored in nearshore and offshore aquifers bordering the coast. (Knapp-USGS)
W73-06723

GENERALIZING WATER TABLE DATA,
North Carolina State Univ., Raleigh. Dept. of Statistics.
L. A. Nelson, R. B. Daniels, and E. E. Gamble.
Soil Science Society of America Proceedings, Vol 37, No 1, p 74-78, January-February 1973. 3 fig, 5 tab, 4 ref.

Descriptors: *Water table, *Water level fluctuations, *North Carolina, *Water balance, Infiltration, Regression analysis, Statistical models, Mathematical models, Meteorological data, Rainfall, Antecedent precipitation, Humidity.

Water table fluctuations were predicted using a 17 variable multiple linear regression model for sites in the Coastal Plain of North Carolina. Because equations were developed individually for each site, the variables involved were mainly meteorological. They included month of year, cumulative rainfall, antecedent rainfall, and relative humidity. The model fit well in 42 of 48 sites. For fall months the model tends to overpredict water levels in dry years and underpredict in wet years. Advantages of the approach are that it allows evaluation of the relative importance of the factors which influence the water table, it allows comparisons among sites using the data for the same or different periods of time, and it is simple to use. (Knapp-USGS)
W73-06732

SINKHOLE,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 04A.
W73-06810

EVALUATION OF PUMPING TESTS IN PARTIALLY PENETRATING WELLS,
Komenskeho Universita, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 04B.
W73-06819

GROUND-WATER INVESTIGATION FOR THE CITY OF VOLGA,
Geological Survey, Vermillion, S. Dak.
For primary bibliographic entry see Field 04B.
W73-06820

ANALOG SIMULATION OF GROUND-WATER DEVELOPMENT OF THE SAGINAW FORMATION, LANSING METROPOLITAN AREA, MICHIGAN,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 04B.
W73-06824

ISOTOPIC COMPOSITION OF WATERS FROM THE DANAKIL DEPRESSION (ETHIOPIA),
Comitato Nazionale per le Ricerche Nucleari, Pisa (Italy). Laboratorio di Geologia Nucleare.
For primary bibliographic entry see Field 02K.
W73-06843

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1969-70,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 04B.
W73-06954

PERMEABILITY-POROSITY PATTERNS AND VARIATIONS IN SOME HOLOCENE SAND BODIES,
Cincinnati Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W73-06965

WATER TABLE DRAWDOWN DUE TO A PUMPED WELL IN AN UNCONFINED AQUIFER,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W73-06966

FLOW NEAR A PUMPED WELL IN AN UNCONFINED AQUIFER UNDER NONSTEADY CONDITIONS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W73-06967

FUNCTIONAL COEFFICIENTS IN THE ANALYSIS OF GROUNDWATER FLOW,
Princeton Univ., N.J. Dept. of Civil and Geological Engineering.
G. F. Pinder, E. O. Frind, and S. S. Papadopulos.
Water Resources Research, Vol 9, No 1, p 222-226, February 1973. 3 fig, 3 ref.

Descriptors: *Groundwater movement, *Finite element analysis, *Mathematical studies, Variaility, Numerical analysis, Porous media.
Identifiers: Galerkin theory.

Although finite element techniques in groundwater flow analyses generally require constant aquifer parameters over each element, variable properties can be handled easily by using isoparametric quadrilateral elements in conjunction with approximating equations generated by using Galerkin's technique. A steady state radial flow problem in which transmissivity varies as a linear function of the radius from the well indicates that the accuracy of the numerical scheme may be improved considerably through the use of functional aquifer coefficients. Whenever a system is characterized by sharp changes in permeability or some other parameter, such as those changes that often appear in geologic cross sections, the use of a constant parameter over an element may be advantageous. In the finite element formulation, integration is carried out over each element independently, and a computer code capable of mixing constant and functional coefficients in the same problem is easily generated. (Knapp-USGS)
W73-06968

EFFECT OF NONLINEAR STABILIZING SALINITY PROFILES ON THERMAL CONVECTION IN A POROUS MEDIUM LAYER,
Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
H. Rubin.
Water Resources Research, Vol 9, No 1, p 211-221, February 1973. 5 fig, 2 tab, 9 ref.

Descriptors: *Convection, *Path of pollutants, *Saline water intrusion, *Porous media, Mixing, *Dispersion, Groundwater movement, Density stratification, Aquifers, Stratified flow, Mass transfer, *Salinity.

Nonlinear salinity profiles may exist in an aquifer when salt water and fresh water are brought into contact. They may be maintained indefinitely by a horizontal flow. The effect of such salinity profiles on marginal stability and overstability, as well as on thermal convection, was investigated. Nonlinearity of the salinity profile affects the stability criteria of the field and changes the shape of the convective cells appearing at instability. Non-

linearity of the profiles may increase the stability more than in the linear case for small values of the Rayleigh number. (Knapp-USGS)
W73-06969

MASS TRANSPORT IN FLOWING GROUNDWATER,
Geological Survey, Lakewood, Colo.
J. D. Bredehoeft, and G. F. Pinder.
Water Resources Research, Vol 9, No 1, p 194-210, February 1973. 20 fig, 18 ref.

Descriptors: *Path of pollutants, *Artesian aquifers, *Georgia, *Groundwater movement, *Saline water intrustion, Encroachment, Mathematical models, Mass transfer, Saline water, Withdrawal, Hydrologic budget.
Identifiers: *Brunswick (Ga).

The mass transport equation and the equation of motion were coupled and solved numerically for a saturated isothermal groundwater system in which there are no chemical reactions. A case history of groundwater contamination at Brunswick, Georgia, illustrates the use of this physical-chemical model in predicting and controlling the future movement of contaminants. The principal artesian aquifer in the Brunswick area is composed of permeable zones in the Ocala and underlying limestones of Clairborne age. At least three more or less isolated zones are recognized. The permeable zones are separated from one another by dense limestones. The units that act as aquifers are highly permeable; caverns have been detected in each. Both the upper and lower water-bearing zones show areas of saltwater contamination. The source of the water is the underlying brackish water zone, the water migrating upward through two natural conduits. These conduits may be associated with a fault. The most feasible measure to protect the well field is to put interceptive pumping in the aquifer between the source of contamination and the pumping center. (Knapp-USGS)
W73-06970

EFFECT OF INTRA-AGGREGATE DIFFUSION ON OSCILLATORY FLOW DISPERSION IN AGGREGATED MEDIA,
Agricultural Research Service, St. Paul, Minn. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 02G.
W73-06971

GROUNDWATER RESOURCES OF MOREHOUSE PARISH, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 04B.
W73-07050

POTENTIAL FOR GROUNDWATER DEVELOPMENT,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 05B.
W73-07060

2G. Water in Soils

UNDERSTANDING AND IMPROVING THE SOIL-PLANT ENVIRONMENT FOR MORE EFFICIENT UTILIZATION OF WATER,
South Dakota State Univ., Brookings. Water Resources Research Inst.
For primary bibliographic entry see Field 03F.
W73-06518

NUTRIENT ENRICHMENT OF RUNOFF WATERS BY SOILS. PHASE I: PHOSPHORUS ENRICHMENT POTENTIAL OF URBAN SOILS IN THE CITY OF MADISON,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W73-06521

MEASUREMENT OF SOIL MOISTURE BY ATTENUATION OF A VERTICALLY POLARIZED RADIO WAVE,
Utah State Univ., Logan.
A. D. Mickelsen.
M Sc Thesis. 1971. 49 p, 8 fig, 3 tab, 25 ref. OWRR B-062 UTAH (1). 14-31-0001-3657.

Descriptors: *Soil moisture, *Radio waves, Measurement, Conductivity, Analytical techniques, *Instrumentation.

The purpose is to determine feasibility and to investigate some of the problems encountered in making soil moisture measurements using radio wave propagation. The procedure consists of propagating a vertically polarized wave over the earth and measuring the field strength attenuation. Present methods of measuring soil moisture are summarized. Certain aspects of radio wave propagation theory are discussed, such as the surface wave, the space wave, the skin depth, and the effect of the dielectric constant on radio wave propagation. Based on this theory, measurement parameters such as frequency, antenna separation, and antenna height were chosen for optimum performance. Using these parameters and information gained from preliminary measurements, the instrumentation was designed and is given in detail. Measurement variables such as antenna height, reflections, temperature, and vegetation were investigated with the use of experimental data. The width of the area affecting the propagating wave was investigated. A relationship between soil moisture and signal strength is presented from measurements taken for various values of soil moisture content.
W73-06532

PERSISTENCE AND METABOLISM OF CHLORODIOXINS IN SOILS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
For primary bibliographic entry see Field 05B.
W73-06632

EFFECT OF SOIL WATER REGIME ON THE NITRATE REDUCTASE ACTIVITY OF CELLULAR STRUCTURES IN MAIZE LEAVES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Fiziologii Rastenii i Agrokhimii.
S. I. Slukhai, T. A. Kuznetsova, and O. E. Shvedova.
Fiziol Biokhim Kul't Rast. Vol 3, No 6, p 581-586. 1971. (English summary).
Identifiers: *Soil-water-plant relationships, Cells, Chloroplasts, Leaves Maize M, Mitochondria, Moisture stress, *Nitrate reductase, Soils, Soil moisture.

Under optimum conditions of water supply, mitochondria possessed a higher nitrate reductase activity than chloroplasts. The cellular structures of leaf tissues in maize grown with a suboptimal level of moisture (35% of total soil moisture capacity) were characterized by decreased nitrate reductase activity. When plants were transferred to a normal regime of water supply (70% of total soil moisture capacity), an upsurge was observed in enzyme activity, which may have been due to induced enzyme synthesis and intensification of enzymatic processes in the cells.—Copyright 1972, Biological Abstracts, Inc.
W73-06662

WATER MOVEMENT IN UNSATURATED SOILS AS INFLUENCED BY GYPSUM,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Div. of Plant Industry.
M. L. Sharma.
Aust J Soil Res. Vol 10, No 1, p 25-33. 1972. Illus.
Identifiers: *Gypsum, *Soil water movement, Soil treatment.

Three soils varying in texture and exchangeable Na were treated either with distilled water or with a gypsum solution of 10 or 30 meq/l concentration and their water-flow properties, diffusivity (D), capillary conductivity (K), and weighted mean diffusivity (D) determined. Invariably the treatment of soils with gypsum resulted in increased D and K, the increases being more pronounced near saturation and declining with desaturation. The soil with the highest clay content and exchangeable sodium percentage (ESP) responded most. For the 3 soils, at the end of the third wetting and draining cycle the highest increase in D and K varied from about 3-15 times while D increased by a factor of 2-7.5. Wetting and draining cycles resulted in decreased D for all soils when distilled water was used, but only for 2 soils when 10 or 30 meq solutions were used. In the soil most responding to gypsum D was slightly increased with increasing number of wetting and draining cycles when gypsum solutions were used. This was due probably to rebuilding of structure by cation exchange, which was lost by slaking and dispersion during the first wetting and draining cycle. The electrolyte concentration of flowing solution did not significantly affect the water flow properties provided that the slaking and dispersion were reduced by a solution of high concentration during the process of cation exchange. At the end of the third wetting and draining cycle, 30 meq solution gave about 1.7 times higher D compared to 10 meq for the high clay, high exchangeable Na soil. This was probably because initial structural loss caused by the first wetting and draining with 10 meq was not fully regained during subsequent wetting and draining.—Copyright 1972, Biological Abstracts, Inc.
W73-06705

BONDING OF WATER TO PEAT AND THE EFFECT OF MECHANICAL WORKING,
Department of Scientific and Industrial Research, Lower Hutt, (New Zealand). Soil Bureau.
N. Wells.
Soil Science, Vol 114, No 1, p 20-23, July 1972. 5 fig, 4 ref.

Descriptors: *Peat, *Differential thermal analysis, *Soil chemistry, Hydrogen bonding, Organic matter, Water loss, Moisture content, Soil water, Soil moisture, Chemical properties.

Three wet peats, one weakly decomposed, the others strongly decomposed, were subjected to mechanical working and examined by differential thermal analysis for changes induced in the bonding of water. Working an undecomposed peat produced little change in physical strength. When strongly decomposed peat was worked there was a marked deterioration in its strength accompanied by a marked increase in height of the sharp low temperature dehydration peak. The broad, high temperature dehydration peak decreased in height, but in one sample it could be recovered by standing for a month. The low temperature sharp endothermic peak near 40 deg C represents the loss of water that had been attached by hydrogen bonding. The high temperature peak near 75 deg C results from the loss of water that had been extensively hydrogen bonded in clusters of water molecules sited internally. Working the organic matter transferred water from the clusters to the surfaces and resulted in the enhancement of the sharp low temperature endothermic peak. Leaving the worked material for a period of time enabled the water that was hydrogen bonded to the surfaces to reform the clusters of hydrogen bonded water molecules within the organic matter and in so doing there was a gain in strength. (Knapp-USGS)
W73-06706

NOMOGRAPH FOR HYDRAULIC CONDUCTIVITY AND INTRINSIC PERMEABILITY OF WATER-SOIL SYSTEM,
A. Zanker.
Soil Science, Vol 113, No 5, p 375-376, May 1972. 1 fig, 1 ref.

Descriptors: *Soil water movement, *Hydraulic conductivity, *Permeability, Percolation, Porous media, Soil moisture, Laboratory tests.
Identifiers: *Nomographs.

A nomograph solves equations to calculate hydraulic conductivity and intrinsic permeability. The nomograph consists of eight graduated scales and three reference lines. In order to use the nomograph, the following variables have to be known: hydraulic conductivity; volume of percolate; length of soil column; cross-sectional area of the soil column; difference in hydraulic head between the inflow and outflow ends of the soil column; and time interval for volume of percolate to pass through the soil. (Knapp-USGS)
W73-06707

THERMODYNAMICS OF SOIL WATER: 1. THE ENERGY CONCEPT OF SOIL WATER,
National Inst. of Agricultural Science, Tokyo (Japan).
S. Iwata.
Soil Science, Vol 113, No 3, p 162-166, March 1972. 4 ref.

Descriptors: *Soil water movement, *Chemical potential, *Sorption, *Ion exchange, *Thermodynamics, Free energy, Clay minerals, Ion transport, Water chemistry.

The state of water in soil may be grasped exactly only by the use of chemical potential concept. Methods for precise definition of chemical potential under potential fields and for describing the variables of state of water in soil are given. Generally, the equations are concerned with the case where the charges on clay surface show change or where the solutes go in and out of the system. It is assumed that the potential field acting upon water in soil does not affect the inner partition function of adsorbed water. (Knapp-USGS)
W73-06708

RELATIVE RATE OF CHLORIDE MOVEMENT IN LEACHING OF SURFACE SOILS,
Agricultural Research Service, Durant, Okla. Water Quality Management Lab.
S. J. Smith.
Soil Science, Vol 114, No 4, p 259-263, October 1972. 1 fig, 3 tab, 15 ref.

Descriptors: *Leaching, *Chlorides, Soil water movement, Ion exchange, Clays, Clay minerals, Ion transport, Soil chemistry, Path of pollutants, Salts.

In leaching of widely varying surface soils, chloride moved through the soils 1.04 to 1.67 times faster than it would if it had been associated uniformly with all the soil water. Increases in chloride movement were highly correlated with cation exchange capacity and surface area. Dispersion coefficients for chloride, calculated from breakthrough curves, ranged from 0.059 sq cm/hr for Amarillo and Quincy soils to 0.700 sq cm/hr for Houston soil. Anion exclusion can be an important factor contributing to loss of anions from soil. (Knapp-USGS)
W73-06709

ON THE DEFINITION OF SOIL WATER POTENTIALS AS PROPOSED BY THE I.S.S.S. IN 1963,
National Inst. of Agricultural Science, Tokyo (Japan).
S. Iwata.
Soil Science, Vol 114, No 2, p 88-92, August 1972. 3 fig, 3 ref.

Descriptors: *Soil water, *Soil moisture, *Chemical potential, *Soil water movement, *Water chemistry, Clay minerals, Adsorption.
Identifiers: *Soil water potential.

The definition of total soil water potential by the International Society of Soil Science (I.S.S.S.) is not only ambiguous but also contains incorrect classification. By using the concept of chemical potential, the relation between chemical potential and water content, and the change in chemical potential as affected by temperature can be calculated. Therefore, it is necessary to redefine the total potential of soil water as the chemical potential of water in soil. (Knapp-USGS)
W73-06710

EFFECT OF FREEZE-THAW CYCLES ON AGGREGATE STABILITY AND HYDRAULIC CONDUCTIVITY OF THREE SOIL AGGREGATE SIZES,
Agricultural Research Service, Burlington, VT. New England Watershed Research Center.
G. R. Benoit.
Soil Science Society of America Proceedings, Vol 37, No 1, p 3-5, January-February 1973. 1 fig, 4 tab, 12 ref.

Descriptors: *Hydraulic conductivity, *Freezing, *Thawing, *Soil water movement, Soil structure, Moisture content, Ice, Porosity, Frozen soils, Frost action, Frost.

The effect of freeze-thaw cycles at two freezing temperatures on the stability and hydraulic conductivity of three soil aggregate sizes, each equilibrated at two water contents, was studied. Breakdown of water-stable aggregates is greatest at maximum water holding contents. Hydraulic conductivity tends to decrease most in soil cores with large aggregates at maximum water-holding capacity. Freezing and thawing soil cores at 0.5 bar water content generally increases hydraulic conductivity. There was an exponential relationship between the change in the ratio of final to initial hydraulic conductivity and the soil water content at freezing. (Knapp-USGS)
W73-06727

A LIMITING FLUX CONDITION IN INFILTRATION INTO HETEROGENEOUS POROUS MEDIA,
New South Wales Univ., Kensington, (Australia). Dept of Civil Engineering.
K. K. Watson, S. J. Perrens, and F. D. Whisler.
Soil Science Society of America Proceedings, Vol 37, No 1, p 6-10, January-February 1973. 3 fig, 2 ref.

Descriptors: *Infiltration, *Unsaturated flow, *Zone of aeration, *Porous media, Hydraulic conductivity, Soil water movement, Wetting, Equations, Heterogeneity.

Infiltration into a porous medium in which the hydraulic conductivity increases with depth quickly approaches a limiting flux condition. This condition is defined by a profile of pressure head which is tangential to the profile water entry value. Equations are given to enable the values of the limiting flux and the elevation of the point of contact to be calculated in terms of the material properties and the boundary conditions. Below the limiting flux an unsaturated zone exists, and wetting in this zone continues under the condition of limiting flux. A method is given to determine the pressure and water content profiles for this zone. (Knapp-USGS)
W73-06728

CHLORIDE MOVEMENT IN UNDISTURBED SWELLING CLAY SOIL,
Texas A and M Univ., College Station.
D. E. Kissel, J. T. Ritchie, and E. Burnett.
Soil Science Society of America Proceedings, Vol 37, No 1, p 21-24, January-February 1973. 3 fig, 3 tab, 13 ref.

Descriptors: *Leaching, *Chlorides, *Expansive soils, *Expansive clays, *Pores, Tracers, Fluorescent dye, Adsorption, Ion exchange, Dispersion, Percolation, Soil water movement, Salts, Soil structure, Porosity, Permeability, Hydraulic conductivity.

Downward leaching of Cl followed large, continuous soil pores in saturated, swelling clay soils. Using water-soluble fluorescein as a tracer, distinct small areas of the soil contained fluorescenin, whereas nearby areas contained no visible fluorescein after water with Cl and fluorescein was ponded at the surface for 1.5 days. Breakthrough curves of a large saturated core of undisturbed swelling clay soil indicated that Cl was moving quite rapidly through large connected pores. In the undisturbed swelling clay soil, the volume of soil water not containing Cl was about 60%; when the disturbed soil was repacked to the same density this value decreased to 40%. More of the original soil solution was eluted from long undisturbed cores than from short undisturbed cores of the same diameter before Cl appeared in the effluent. The longer core wall blocked more connected flow paths which were not vertical. (Knapp-USGS)
W73-06729

AN EXAMINATION OF THE WET AGGREGATE ANALYSIS, THE MOISTURE CHARACTERISTIC, AND INFILTRATION PERCOLATION METHODS OF DETERMINING THE STABILITY OF SOIL AGGREGATES,
Sydney Univ. (Australia). Dept. of Soil Science.
N. Collis-George, and K. B. Laryea.
Aust J Soil Res. Vol 10, No 1, p 15-24. 1972. Illus.
Identifiers: *Soil aggregates, *Soil classification, Soil analysis, Infiltration, Methods, Moisture, Percolation, Soils, Stability, Soil stability.

Four methods of assessing structural stability of aggregates which employ different disruptive forces were examined. Sorptivity (Philip 1957) was a useful method of assessing structural stability of soils during infiltration. The results obtained are consistent with those using either the high energy moisture characteristic method of Childs (1940, 1942), the wet aggregate analysis method of Quirk (1950), and the qualitative slaking-dispersion classification of aggregates proposed by Emerson (1967). Using these 4 methods, 1 soil was classified as stable, and 2 unstable to flood irrigation, whereas conventional chemical definitions did not distinguish unequivocally between them. Copyright 1972, Biological Abstracts, Inc.
W73-06748

AFLATOXIN FORMATION IN FEEDLOT WASTES AND REMOVAL DURING WATER TREATMENT PROCEDURES,
Colorado State Univ., Ft. Collins.
For primary bibliographic entry see Field 05D.
W73-06761

SECONDARY CONSOLIDATION AND STRENGTH OF A CLAY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08D.
W73-06811

INTERSTITIAL WATER COMPOSITION AND GEOCHEMISTRY OF DEEP GULF COAST SHALES AND SANDSTONES,
Amoco Production Co., Tulsa, Okla.

G. W. Schmidt.
American Association of Petroleum Geologists Bulletin, Vol 57, No 2, p 321-337, February 1973. 11 fig, 2 tab, 23 ref.

Descriptors: *Diagenesis, *Clays, *Pore water, *Water chemistry, Dehydration, Salinity, Geochemistry, Sandstones, Shales, Connate water, Ion exchange.

Interstitial water from shales and sandstones are different both in concentration and in composition. Sidewall cores of shales were taken every 500 ft between 3,000 and 14,000 ft in a well in Calcasieu Parish, Louisiana. The total dissolved solids concentration differed in waters from normally pressured sandstones (600-180,000 mg/liter) and highly pressured sandstone (16,000-26,000 mg/liter). Shale pore water has a lower salinity than the water in the adjacent normally pressured sandstones, but the concentrations are more similar in the high pressure zone. Conversion from predominantly expandable to nonexpandable clays accelerates near the top of the high pressure zone, which appears correlative with a major temperature gradient change, an increase in shale porosity, a lithology change to a massive shale, an increase in shale conductivity, an increase in fluid pressure, and a decrease in the salinity of the interstitial waters. Clays subjected to diagenetic change release two layers of deionized water and this released water may be responsible for the lower salinity of the water found in the high pressure section. (Knapp-USGS)
W73-06834

INFLUENCE OF TEXTURE ON POROSITY AND PERMEABILITY OF UNCONSOLIDATED SAND,
Shell Oil Co., Midland, Tex.
D. C. Beard, and P. K. Weyl.
American Association of Petroleum Geologists Bulletin, Vol 57, No 2, p 349-369, February 1973. 11 fig, 7 tab, 27 ref.

Descriptors: *Porosity, *Permeability, *Sands, *Sediment sorting, Pores, Particle size, Laboratory tests, Permeameters, Compaction, Hydrologic properties, Sedimentology, Particle shape.

The relations among porosity, permeability, and texture of artificially mixed and packed sand were studied to determine the approximate porosity and permeability values to be expected for unconsolidated sand of eight grain-size subclasses and six sorting groups. The porosity of wet-packed sand remains about the same for changes in grain size of a given sorting, but decreases from an average of 42.4% in extremely well-sorted sand to 27.9% in very poorly sorted sand. These experimental data agree within 5% with framework porosity values of 25 natural Holocene barrier-island sands. This is representative of minimum porosities expected for natural packing of most unconsolidated, clay-free sand. The average permeability becomes progressively lower with decreasing grain size and poorer sorting, and agrees well with the permeability of sand of most grain-size and sorting classes. (Knapp-USGS)
W73-06835

CONTROLLING THE SOIL MOISTURE ENVIRONMENT OF TRANSPIRING PLANTS,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 02D.
W73-06866

COMPARISON OF OXYGEN-BOMB COMBUSTION WITH STANDARD IGNITION TECHNIQUES FOR DETERMINING TOTAL ASH,
Dartmouth Coll., Hanover, N.H. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W73-06929

EFFECT OF INTRA-AGGREGATE DIFFUSION ON OSCILLATORY FLOW DISPERSION IN AGGREGATED MEDIA,
Agricultural Research Service, St. Paul, Minn. Soil and Water Conservation Research Div.
D. A. Farrell, and W. E. Larson.
Water Resources Research, Vol 9, No 1, p 185-193, February 1973. 3 fig, 21 ref.

Descriptors: *Dispersion, *Unsteady flow, *Porous media, Diffusion, Diffusivity, Particle size, Mixing, Path of pollutants, Porosity, Atmospheric pressure, Soil water movement, Ion transport, Mass transfer.

A theoretical study of oscillatory flow dispersion in aggregated media examines the effect of aggregate size, the coefficient of diffusion, and the frequency of the oscillations in fluid velocity on the separate contribution of intra-aggregate diffusion to dispersion. Radial diffusion within the aggregates gives rise to a pulsating sink-source feature in the dispersion process. For selected dispersion phenomena the contribution of this reservoir or capacitance factor on intra-aggregate porosity can be substantial. For example, when atmospheric turbulence produces an appreciable mass flow of air within a loose soil mulch, the component of dispersion directly attributable to radial diffusion within the soil aggregates may be greater than molecular diffusion by an order of magnitude. (Knapp-USGS)
W73-06971

ACOUSTIC PROPERTIES OF FROZEN OTTAWA SAND,
Cold Regions Research and Engineering Lab., Hanover, N.H.
Y. Nakano, and R. Arnold.
Water Resources Research, Vol 9, No 1, p 178-184, February 1973. 7 fig, 2 tab, 14 ref.

Descriptors: *Seismic studies, *Physical properties, *Frozen soils, *Sands, *Acoustics, Sound waves, Porous media, Freezing, Thawing, Shear, Seismic properties, Soil mechanics.

Ultrasonic velocities of dilatational and shear waves as well as damping of dilatational waves in frozen Ottawa sand were measured as a function of water content by using the critical angle method at a frequency of 1 MHz. The dilatational velocity was found to vary with increasing water content from about 0.35 km/sec to 4.6 km/sec. The shear velocity also increases monotonically with increasing water content. The results of damping measurements showed a general trend for the quality factor O to decrease monotonically with decreasing water content. (Knapp-USGS)
W73-06972

NUMERICAL TREATMENT OF THE UNSATURATED WATER FLOW EQUATION: COMPARISON OF EXPERIMENTAL AND COMPUTED RESULTS,
Niedersaechsisches Landesamt fuer Bodenforschung, Hanover (West Germany).
W. Giesel, M. Renger, and O. Strebel.
Water Resources Research, Vol 9, No 1, p 174-177, February 1973. 4 fig, 5 ref.

Descriptors: *Infiltration, *Unsaturated flow, *Numerical analysis, *Equations, Infiltrometers, Laboratory tests, Hysteresis, Soil water movement.

A numerical solution of the differential equation governing the unsaturated vertical water flow in soils was applied to results of infiltration and redistribution experiments carried out in a sand column. The boundary condition at the bottom was determined through the fact that during the first 3-4 hours all the water accumulated in the soil. The computed and measured water contents and water suctions agree well. Hysteresis is taken into consideration in this numerical treatment. The agreement between experimental and numerical results is satisfying. (Knapp-USGS)
W73-06973

EFFECTS OF AIR PRESSURE ON WATER FLOW IN AN UNSATURATED STRATIFIED VERTICAL COLUMN OF SAND,
Grenoble Univ. (France). Laboratoires de Mecanique des Fluides.
G. Vachaud, M. Vauclin, D. Khanji, and M. Wakil.
Water Resources Research, Vol 9, No 1, p 160-173, February 1973. 9 fig, 1 tab, 20 ref.

Descriptors: *Unsaturated flow, *Atmospheric pressure, *Infiltrometers, *Infiltration, Soil water movement, Zone of aeration, Tensiometers, Instrumentation, Sands.

The effects of air pressure on constant flux infiltration and gravity drainage were studied experimentally by the use of a vertical stratified column of unsaturated soil. Water content was measured by gamma ray attenuation; water pressures were obtained simultaneously at 10 different levels in the column by using tensiometers connected to pressure transducers. In addition, the differential ports of some transducers were connected to the external atmosphere or to the soil air phase by using hypodermic needles inserted through the column wall. The soil column consisted of fine sand over coarse sand over fine sand. The wall of the column was provided with a series of adjustable air ports to allow experiments either with or without lateral air movement. The local soil air pressure can differ significantly from the external atmospheric pressure, for instance plus50 mb for rain with an intensity of 3 cm/hr or minus15 mb for gravity drainage. The water flow depends not only on the boundary conditions in terms of water content or water pressure but also on the air pressure conditions. The air pressure must be taken into account in determining the soil water suction, and the flow equations must be written in terms of two-phase immiscible fluid flow. (Knapp-USGS)
W73-06974

MICROSCOPIC INVESTIGATIONS OF WATER MIGRATION AT THE WETTING FRONT (MIKROSKOPICHESKOYE IZUCHENIYE MIGRATSII VLAGIANA FRONTE SMACHIVANIYA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
A. V. Zhurov.
Pochvovedeniye, No 3, p 51-57, March 1972. 2 fig, 22 fig.

Descriptors: *Soil physics, *Soil water movement, *Wetting, *Microscopy, *Model studies, Absorption, Capillary action, Capillary conductivity, Percolation, Pores, Water vapor, Condensation, Evaporation.
Identifiers: *USSR.

Microscopic methods were used in model studies of water migration in the pore space of soil. A complex mechanism of water migration in the soil profile was observed during absorption of water in the percolation stage and during its capillary rise. As the wetting front moves, water evaporates from the surface of menisci and migrates in the direction of motion. Vapor condenses directly ahead of the wetting front and is absorbed into the front during subsequent movement of the water body. In a polydispersed medium with pores of different size, the wetting front moves through relatively small pores, bypassing the larger pores where air is trapped. The assumption that water moves more rapidly in large pores has not been confirmed experimentally and requires further study. (Josefson-USGS)
W73-06979

WATER REGIME OF GRAY FOREST LOAM IN THE SUBTAIGT ZONE OF WEST SIBERIA (VODNYY REZHIM SEROY LESNOY SUGLINISTOY POCHVY PODTAYEZHNOY ZONY ZAPADNOY SIBIRI),
Ministerstvo Selskogo Khozyaistva, Kurgan (USSR).
V. G. Bezvikonnyy.
Pochvovedeniye, No 3, p 58-65, March 1972. 3 fig, 6 tab, 11 ref.

Descriptors: *Soil physics, *Soil water, *Soil water movement, *Soil-water-plant relationships, *Soil types, Forest soils, Loam, Chernozems, Soil properties, Crop production, Crop response, Fertilizers, Climatology, Meteorology, Precipitation (Atmospheric), Seasonal.
Identifiers: *USSR, *West Siberia, Taiga.

Investigations of the availability of water to crops in Gray-Forest loam soil were based on long-period observations at the Tara agrometeorological station in Omsk Oblast. The amount of available water in Gray-Forest loam is higher than that in Chernozems of the West Siberian forest steppe and equal to that in plowed soils of the nonchernozem zone of the European USSR. Gray loam soil in the subtaiga zone often has a high moisture content at the time of spring planting following predecessor crops, and its productivity can be increased through the proper selection of predecessor crops and the extensive use of organic and mineral fertilizers. (Josefson-USGS)
W73-06980

LEACHING OF STRONTIUM-90 FROM SOIL BY SURFACE WATERS (VYMYVANIYE STRONTAIYA-90 IZ POCHVENNOGO POKROVA POVERKHNOSTNYMI VODAMI),
Institut Prikladnoi Geofiziki, Moscow (USSR).
V. V. Pisarev, I. A. Koloskov, V. M. Kuznetsova, and I. S. Tsybizov.
Pochvovedeniye, No 3, p 66-75, March, 1972. 3 fig, 6 tab, 4 ref.

Descriptors: *Soil chemistry, *Leaching, *Strontium radioisotopes, *Surface waters, Melt water, Rain water, Ephemeral streams, Forest soils, Soil contamination, Radioactivity.
Identifiers: *USSR.

The leaching rate of strontium-90 from soil by melt water, rain water, and ephemeral streams was investigated on 16 experimental plots of Dark Gray Forest soil. Other conditions being equal, the amount of strontium-90 removed from the soil by surface waters is determined mainly by (1) the specific distribution of strontium-90 in the soil profile and (2) the volume of surface waters leaching the contaminated soil. Decontamination coefficients, defined as the ratio of the amount of strontium-90 removed from soil by surface waters in a specified period of time to the amount present in a particular contaminated area before leaching, were small, averaging 0.62% and 0.16% a year for plots contaminated 2 and 10 years, respectively. (Josefson-USGS)
W73-06981

LEACHING OF NITRATES IN DARK CHESTNUT SOIL OF ZAILISKI ALA TAU (O VYMYVANII NITRATOV V TEMNO-KASHTANOVOY POCHVE ZAILIYSKOGO ALATAU),
Kazakhskii Gosudarstvennyi Selskokhozyaistvennyi Institut, Alma-Ata (USSR).
T. T. Tazabekov, and N. N. Malyar.
Pochvovedeniye, No 3, p 84-87, March, 1972. 4 tab, 7 ref.

Descriptors: *Soil chemistry, *Nitrates, *Nitrification, *Leaching, *Chestnut soils, Moisture content, Field capacity, Precipitation (Atmospheric), Meteoric water, Irrigation water, Irrigation, Plant growth, Potatoes, Seasonal.
Identifiers: *USSR, *Zailiski Ala Tau.

Results are presented of a three-year (1968-70) study of the nitrate content of Dark Chestnut soil in a potato field in the Talgar peidmont region of Alma-Ata Oblast. When the moisture content of individual soil layers approaches or exceeds total field moisture capacity, nitrates are leached to a depth of 3 m by irrigation water and atmospheric precipitation (500-600 mm/year). The amount of nitrate nitrogen leached by these waters is 10-13 kg/ha or 10%-60% of the seasonal average. (Josefson-USGS)
W73-06982

N. G. MINASHINZ.
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.

Pochvovedeniye, No 3, p 115-120, March, 1972. 1 tab, 14 ref.

Descriptors: *Model studies, *Land reclamation, *Saline soils, *Leaching, Salts, Salinity, Irrigation water, Groundwater, Gravitational water, Soil water, Soil water movement, Diffusion, Aqueous solutions, Equations.
Identifiers: *USSR, Desalinization, Mineralization.

An equation, based on the physicochemical law of mass action, was developed to describe the soil desalinization process and the changes occurring in the soil solution concentration during leaching of saline soils. A formula is derived for computing the leaching rates needed to reclaim loessial loam of the Sierozem zone. (Josefson-USGS)
W73-06983

CONTRIBUTION TO THE THEORY OF THE FILTRATION EFFECT (K TEORII FIL'TRATSIONNOGO EFFEKTA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
S. M. Pakshina.
Pochvovedeniye, No 3, p 133-138, March, 1972. 2 fig, 1 tab, 14 ref.

Descriptors: *Soil chemistry, *Soil physics, *Filtration, *Filters, *Aqueous solutions, Solutes, Solvents, Ions, Ion transport, Diffusion, Soil moisture, Porous media, Equations.
Identifiers: *USSR, Water films.

Theoretical computations were made of ion filtration coefficients for diluted FeC13, CuC12, and NaC1 solutions passed through sand and soil filters. A comparison of computed values with experimental values shows that the filtration coefficient depends on the ratio of the thickness of the water-conducting film to that of the double layer. As solution concentration increases, the range of filtration coefficient values at small double-layer thicknesses decreases, and the filtration effect becomes barely detectable in the experiment. (Josefson-USGS)
W73-06984

RELATION BETWEEN SUCTION PRESSURE IN THE SUPRACAPILLARY HORIZON OF QUARTZ SAND AND MINIMUM MOISTURE CAPACITY (O SOOTNOSHENII MEZHDU VSASYVAYUSHCHIM DAVLENIYEM V NSDKAPILLYAROOM GORIZONTE I VELICHINOY NAIMAN'SHEY VLAGOYEMKOSTI V KVARTSEVOO PEAKE),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
G. I. Romanova.
Pochvovedeniye, No 4, p 76-82, April 1972. 4 fig, 2 tab, 7 ref.

Descriptors: *Soil physics, *Soil moisture, *Moisture content, *Pressure, Water pressure, Hydraulic gradient, Piezometry, Water levels, Gravitational water, Capillary fringe, Tensiometers, Particle size, Sands, Soil horizons.
Identifiers: *USSR.

The hypothesis advanced by Soviet soil scientist A. A. Rode concerning the nature of suction pressure in the supracapillary horizon of soil after it has been completely wetted and gravitational water has drained is confirmed in an experiment with a column of quartz sand. The suction pressure, expressed in cm of water column, is constant at minimum moisture capacity and numerically equal to the thickness of the capillary fringe in the given soil (Josefson-USGS)
W73-06986

AVAILABILITY OF WATER TO PLANTATIONS OF PINE ON SANDY SOILS OF THE ARCHEDA REGION (VLAGOOBEAPEOHENNOST; SOSNOVYKH KUL'TUR NA PESCHANYKH POCHVAKH NA ARCHEDINSKIKH PESKAKH),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
Kong Tau, Tran, and M. Ye. Ginzburg.
Pochvovedeniye, No 4, p 83-87, April, 1972. 16 ref.

Descriptors: *Soil physics, *Moisture availability, *Available water, *Soil-water-plant relationships, *Pine trees, Sands, Soil moisture, Moisture stress, Moisture tension, Moisture deficit, Transpiration, Meteorology, Water storage, Water table, Groundwater, Hygrometry.
Identifiers: *USSR.

Observations of water storage and transpiration in soil and coniferous needles of 8- and 60-year old pine were based on investigations at the Archeda forestry farm in the dry steppe zone of Volgograd Oblast in June-August 1970. Despite a high-water table (1.5-2.5 m), water storage and moisture tension in the upper meter of soil varied considerably during the growing period depending on the precipitation regime. In dry periods moisture tension dropped to minus 30 atm in the soil and to minus 40 atm in the needles. Despite the presence of readily available groundwater at a depth of 1.5-2 m, relative transpiration decreased accordingly to 0.2-0.1, indicating an acute moisture deficit. Thinning is recommended as the only reliable means of improving the water regime of pine. (Josefson-USGS)
W73-06987

FIRST RESULTS OF OBSERVATIONS IN AN OPEN-CYLINDER LYSIMETER (PERVYYE ITOGI NABLYUDENIY V OTKRYTOM LYSIMETER),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
M. A. Vinnik, and N. N. Bolyshev.
Pochvovedeniye, No 4, p 114-121, April, 1972. 2 fig, 8 tab, 3 ref.

Descriptors: *Lysimeters, *Moisture content, *Soil water, *Percolation, *Water loss, Water analysis, Soil analysis, Chemical analysis, Plant growth, Fertilization, Trees, Crops, Forage grasses, Alfalfa, Clovers, Loam.
Identifiers: *USSR, Spruce trees, Timothy, Taiga.

The open-cylinder lysimeter at the soil station of Moscow State University on the Lenin Hills was designed to study soil formation in mantle loam under vegetation typical of the southern part of the taiga zone. The lysimeter consists of 20 individual compartments, each 9 sq m in area, 1.5 m deep, and 13.5 cu m in volume. Four of the compartments were planted to spruce, four to mixed trees (spruce, maple and oak), and four to deciduous trees (maple and Oak). Four compartments contained meadow vegetation consisting of orchardgrass, ryegrass, timothy, alfalfa, and clover. Two compartments, which served as controls, were left without vegetation, and two were planted to crops in a field crop rotation. A diagram showing the design and planting arrangement is accompanied by data on amount and chemical composition of lysimeter waters and annual seedling growth in 1967-69. (Josefson-USGS)

W73-06988

APPLICATION OF A NEW ANALYTICAL METHOD TO A MODEL OF NON-DARCIAN CONSOLIDATION IN CLAY SOILS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
For primary bibliographic entry see Field 08D.
W73-07044

EVAPORATION OF WATER FROM SAND, 1: EXPERIMENTAL SET-UP AND CLIMATIC INFLUENCES,
National Inst. for Water Research, Windhoek (South-West Africa). Regional Lab.
For primary bibliographic entry see Field 02D.
W73-07055

EVAPORATION OF WATER FROM SAND, 2: DIURNAL VARIATIONS,
National Inst. for Water Research, Windhoek (South-West Africa). Regional Lab.
For primary bibliographic entry see Field 02D.
W73-07056

INTERRELATIONSHIPS BETWEEN SITE FACTORS AND PRODUCTIVITY OF RADIATA PINE AT RIVERHEAD FOREST, NEW ZEALAND,
New Zealand Forest Service, Rotoura.
For primary bibliographic entry see Field 04A.
W73-07088

FIELD STUDY OF MOISTURE MOVEMENT AND GROUND HEAVE DURING FREEZE-UP,
McGill Univ., Montreal (Quebec). Soil Mechanics Lab.
R. N. Yong, and P. V. Janiga.
Soil Mechanics Series no 30, November 1971.

Descriptors: *Frozen soils, *Heaving, *Soil mechanics, *Freeze-thaw tests, Frozen.
Identifiers: *Moisture movement.

A study of the in-situ soil freezing to provide an understanding of the mechanisms involved in the problem was conducted during a two year period from Oct. 1968 to Oct. 1970. In this report only the second year results are used since the first year study served to provide guidelines. The specific objectives covered in this report relate to water migration during and after the freeze-up period contributing thereby to the freeze-thaw problem, influence of salts aided to the surface prior to freeze-up in the overall migration and freeze-thaw phenomenon, and overall observations of ground movement due to freeze-thaw, surcharge, and other factors. The control soil used was 'Seaway Fill,' finer than 0.1 mm, compacted in 12 in diam, 5 ft long cylinders buried in a constructed embankment. Results and evaluation in terms of frost heaving and salt conditioning are presented in the final chapter. (OWRR)
W73-07110

SPRINKLING AND PONDING TECHNIQUES FOR RECLAIMING SALINE SOILS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 03C.
W73-07127

2H. Lakes

A STUDY OF PHYTOPLANKTON DYNAMICS IN LAKE FAYETTEVILLE AS A MEANS OF ASSESSING WATER QUALITY,
Arkansas Univ., Fayetteville. Water Resources Research Center.
For primary bibliographic entry see Field 05C.
W73-06510

THE INFLUENCE OF HERBICIDES USED ON HORTICULTURAL CROPS ON STREAM ECOLOGY,
Michigan State Univ., East Lansing. Dept. of Horticulture.
For primary bibliographic entry see Field 05C.
W73-06527

MUSKEGON LAKE STUDY, A PRELIMINARY POLICY STATEMENT.
West Michigan Shoreline Regional Planning Commission, Muskegon.
For primary bibliographic entry see Field 06B.
W73-06605

REPORT ON WATER DISTRIBUTION IN THE LAKE TAHOE REGION.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 06D.
W73-06613

ESTIMATING THE RATE OF DEGRADATION OF CELLULOSE FIBERS IN WATER,
Uppsala Univ., (Sweden). Inst. of Limnology.
For primary bibliographic entry see Field 05C.
W73-06678

U.S. AND CANADA AGREE ON ANTI-POLLUTION MEASURES FOR THE GREAT LAKES.
For primary bibliographic entry see Field 05G.
W73-06689

THE EFFECT OF TEMPERATURE AND WATER CHEMISTRY ON THE LIFE-CYCLE OF PLANARIS TORVA (MULLER) (TURBELLARIS:TRICLADIDA),
University Coll. of North Wales, Bangor. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W73-06691

WIND-DRIVEN CURRENTS IN LAKE ERIE,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
R. T. Gedney, and W. Lick.
Journal of Geophysical Research, Vol 77, No 15, 2714-2723, May 20, 1972. 6 fig, 2 tab, 11 ref.

Descriptors: *Mass transfer, *Lake Erie, *Currents (Water), Winds, Mathematical studies, Numerical analysis, Lake morphology, Lake morphometry, Measurement, Correlation analysis, Evaluation, Forecasting.
Identifiers: *Wind-driven currents.

The steady-state wind-driven currents in Lake Erie were investigated using field measurements and a numerical solution for the mass-transport stream function and the three-dimensional velocities as a function of depth and horizontal position. Comparison of the model with measurements was good. In the numerical analysis, flow is steady, density is consitant, and coefficients of eddy viscosity in the horizontal and vertical directions are of differenct magnitudes (and also independent of position) but are dependent on wind velocity. Time-dependent effects can be very important but there are periods when the currents are essentially steady, which make a steady-state analysis applicable. Lake Erie is stratified during the summer months but during the rest of the year its temperature and density are fairly constant throughout. Therefore the analysis applies only to the spring, fall, and those periods in the winter when the lake is not iced over. (Woodard-USGS)
W73-06812

THERMAL WATER OCCURRENCE ON THE SOUTHERN SHORE OF LAKE BALATON (HEVIZELOFORDULASI VISZONYOK A BALATON DELI PARTVIDEKEN),
K. Korim, and P. Liebe.
Vizugyi Kozlemenyek, No 2, p 162-179, 1972. 8 fig, 2 tab, 5 ref. English summary.

Descriptors: *Thermal water, *Hydrothermal studies, *Exploration, *Hydrogeology, Gravity studies, Geophysics, Magnetic studies, Seismic studies, Electrical studies.
Identifiers: *Hungary, *Lake Balaton.

Prospecting for thermal waters included study of geological, hydrogeological, geothermal and chemical conditions of groundwater on the southern shore of Lake Balaton, Hungary. Paleozoic, mesozoic, and Tertiary formations were considered for their potential thermal water content. The tectonic structure and processes are responsible for a southwestern depression favorable for the occurance of thermal water. The extent of thermal water-bearing formations, their magnitude and main characteristics, the chemical character of water, and the geothermal conditions are discussed. Explorations included gravity, magnetic, seismic refraction and geoelectric resistance measurements. (Knapp-USGS)
W73-06841

ECOLOGICAL IMPACT OF FLUCTUATING WATER LEVELS IN RESERVOIRS,
Virginia Cooperative Fishery Unit, Blacksburg.
For primary bibliographic entry see Field 05G.
W73-06849

TEMPERATURE, TRANSPARENCY, AND PHYTOPLANKTON PRODUCTIVITY IN CRATER LAKE, OREGON,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 05C.
W73-06863

THE ROACH (RUTILUS TURILUS L.) OF LAKE PILBURG,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
W. Kolder.
Acta Hydrobiol, Vol 13, No 4, p 491-506, 1971, Illus, English summary.
Identifiers: *Austria, *Lake Pilburg, *Roach, Rutilus turilus.

R. rutilus of Lake Pilburg (915 m above sea level, Tyrol, Austria) is described morphologically and its nutritional selectivity was studied. In comparison with other waters, the growth of this population can be considered very good. The arithmetic mean and standard deviation of linear measurements and body weight of particular roach age groups were calculated, as well as the coefficient of variability of linear measurements and body weight. The significance of the sexual dimorphism in the 5th and 6th age groups was tested by Student's test. The meristic features were calculated and tabulated.–Copyright 1972, Biological Abstracts, Inc.
W73-06900

REPORT ON LAKE TAHOE REGION WASTE WATER COLLECTION, TREATMENT AND DISPOSAL.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 05D.
W73-06904

LIMNOLOGY AND WATER QUALITY OF THE LAKE TAHOE REGION, A GUIDE FOR PLANNING.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 05G.
W73-06905

HYDROLOGY AND WATER RESOURCES OF THE LAKE TAHOE REGION, A GUIDE FOR PLANNING.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 06B.
W73-06906

WATER RESOURCES IN THE LAKE TAHOE REGION.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 06E.
W73-06907

ASSAULT ON A LAKE,
For primary bibliographic entry see Field 05B.
W73-06925

THE SURFICIAL SEDIMENTS OF LAKE HURON,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 02J.
W73-06956

THE DISTRIBUTION OF MERCURY IN THE SURFICIAL SEDIMENTS OF LAKE HURON,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 05B.
W73-06957

SEDIMENT DISCHARGED FROM CANADIAN BASINS INTO LAKE ONTARIO,
Queen's Univ., Kingston (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 02J.
W73-06958

DYNAMIC SURFACE TEMPERATURE STRUCTURE OF THERMAL PLUMES,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 05B.
W73-06976

AN ESTIMATE OF THE ROLE OF LAKE EFFECT SNOWSTORMS IN THE HYDROLOGY OF THE LAKE ERIE BASIN,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 02C.
W73-06978

STOCHASTIC ANALYSIS OF LAKE SUPERIOR ELEVATIONS FOR COMPUTATION OF RELATIVE CRUSTAL MOVEMENT,
Department of the Environment, Ottawa (Ontario). Water Management Service.
G. W. Kite, and K. Adamowski.
Journal of Hydrology, Vol 18, No 2, p 163-175, February 1973. 5 fig, 4 tab, 13 ref.

Descriptors: *Water levels, *Lake Superior, *Time series analysis, *Stochastic processes, Regression analysis, Water level fluctuations, Frequency analysis, Statistics, Statistical methods, Land subsidence.
Identifiers: *Crustal movement, *Isostasy.

Lake Superior mean monthly water levels were recorded at five gages around the lake, and time series of elevations and differences in elevations between pairs of gages were analyzed for trends, periodicities and autoregressive components. The variance of the time series of elevations consisted of 4%-12% linear trends, 35%-44% periodicities in the mean, 0.23%-0.66% periodicities in the variance, a 43%-54% autoregressive component and a 5% random component. The time series of differences in lake elevations consistof 30%-52% linear trends, 5%-35% periodicities in the mean and variance, up to 30% autoregressive component and a random component of 21%-31%. Rates of crustal movement were computed from the trends in gage differences. (Knapp-USGS)
W73-07047

FRESHWATER FERROMANGANESE CONCRETIONS: CHEMISTRY AND INTERNAL STRUCTURE,
Florida State Univ., Tallahassee. Dept. of Oceanography.
R. G. Harriss, and A. G. Troup.
Science, Vol 166, No 3905, p 604-606, October 1969. 1 fig, 1 tab, 7 ref.

Descriptors: *Water chemistry, *Lakes, *Chemical analysis, *Canada, Dating, Age, Chemical properties, Iron, Manganese, Trace elements, Theoretical analysis, Correlation analysis, Analytical techniques, Microscopy, X-Ray diffraction.

Studies by optical microscopy, x-ray diffraction, and electron probe techniques of ferromanganese concretions from three Canadian lakes (two in Nova Scotia and one in Ontario) reveal chemical banding of amorphous hydrated iron and manganese oxides. The average ratio of iron to manganese in concretions from these lakes varies from 0.43 to 2.56. The concentrations of cobalt, nickel, copper, and lead are one to two orders of magnitude below those reported for oceanic ferromanganese concretions. A pair of oxide bands, one Fe-rich and one Mn-rich, could represent the annual growth increment of the ferromanganese concretions. Growth rates calculated on this assumption range from 0.1 mm/year in the Nova Scotia lakes to 1.5 mm/year in Mosque Lake, Ontario. If the assumption is valid, it provides a useful method for the determination of concretion age and growth rates. At the growth rates indicated, the largest nodules observed would have initiated growth approximately 1600 years ago. This could indicate a physical limit on concretion size at approximately 16 cm or a physicochemical change in lake conditions 1600 years ago. (Woodard-USGS)
W73-07054

SOCKEYE SALMON IN LAKE SARANNOYE ON THE COMMANDER ISLANDS, (IN RUSSIAN),
S. L. Kurenkov.
Izv Tikhookean Nauchno-Issled Inst Rybn Khoz Okeanogr. 78 p 49-60. 1970. (English summary).
Identifiers: Commander Islands, *Lake Sarannoye, *Salmon, USSR.

A short biological sketch of one of the shoals of sockeye which breed in Lake Sarannoye on Bering Island is presented. A description of the lake is included.--Copyright 1972, Biological Abstracts, Inc.
W73-07076

ABSENCE OF SEASONAL GROUPING IN SOCKEYE SALMON IN A BASIN OF THE OZERNAYA RIVER, (IN RUSSIAN),
T. V. Egorova.
Izv Tikhookean Nauchno-Issled Inst Rybn Khoz Okeanogr. 78 p 43-47. 1970. (English summary).
Identifiers: Crustacea, Fish diet, Grouping, *Ozernaya River, *Salmon, Seasonal, Spawning, USSR, *Lake Kuril.

Sockeye which reproduce in the basin of Lake Kuril (Ozernaya River) have a long spawning period with a single peak on homogeneous spawning grounds. Lake sockeye young inhabit the pelagic depths of the lake beginning with the fingerling stage. They feed almost exclusively on 1 sp. of planktonic crustacean. The communal quality of the habitat and nature of the nutrition suggest homogeneity in the lake stage.--Copyright 1972, Biological Abstracts, Inc.
W73-07077

CHANGE IN PHYSICOCHEMICAL PROPERTIES OF INFILTRATION WATERS OF THE KIEV RESERVOIR AND THEIR EFFECT ON PRODUCTIVITY OF PINE FORESTS, (IN RUSSIAN),
For primary bibliographic entry see Field 04A.
W73-07086

2I. Water in Plants

WATER REGIME AND STATE OF PLANT PLASTID APPARATUS, (IN RUSSIAN),
Akademiya Nauk Moldavskoi SSR, Kishinev. Inst. of Plant Physiology and Biochemistry.
M. D. Kushnirenko, T. N. Medvedeva, and E. V. Kryukova.
Fiziol Biokhim Kul't Rast. Vol 3, No 6, p 563-568. 1971. Illus. English summary.
Identifiers: *Water requirements, *Chlorophyll, Chloroplasts, Drought, Leaves, Pigments, Plants, Plastids, Protein, Drought resistance, Wilting.

The results of investigations to detect a nonspecific role of green plastids in water structure ordering are presented. The chloroplasts were shown to have notably higher water-holding powers in comparison with those of a leaf. A different reaction of chlorophyll a and b on dehydration was found. Drought conditions affected to a lesser degree the quantity of segments strongly bound with the lipoprotein complex, particularly of chlorophyll b. In wilting, the least changes in the content of pigments, especially of the strongly bound chlorophyll form, were found in drought-resistant plants.--Copyright 1972, Biological Abstracts, Inc.
W73-06542

PRESENT METHODS FOR STUDYING THE CONDITION OF WATER AND MOLECULAR MECHANISMS OF WATER EXCHANGE IN PLANT CELLS (IN RUSSIAN),
Kazan Inst. of Biology (USSR).
N. A. Gusev, and N. V. Sedykh.
S-Kh Biol. Vol 6, No 6, p 930-939. 1971. Illus. English summary.
Identifiers: *Analytical techniques, *Water balance, Plant physiology, Calorimetry, Cells, Plants, Refractometry, Spectroscopy.

The promising effectiveness of the methods (dielectric and IR spectroscopy, NMR (spin-echo) and EPR, calorimetry and refractometry) for the investigation of the water regime of plants is shown.--Copyright 1972, Biological Abstracts, Inc.
W73-06611

INTRACELLULAR HYDRATING-DEHYDRATING WATER EXCHANGE IN PROTOPLASM (IN RUSSIAN),
Kazan State Univ. (USSR).
N. V. Sedykh.
Fiziol Biokhim Kul't Rast. Vol 3, No 1, p 82-86. Illus. 1971. English summary.
Identifiers: *Cytological studies, *Water requirements, Cells, Dehydration, Exchange, Hydration,

Membranes, Plant cells, Protoplasm Thermal motion.

The hydration dehydration process of hydrophilic components is considered to be a type of intracellular water exchange. The water exchange may be characterized by the life-time of a water molecule in the hydrated membrane and by a quantity of hydrating water. It is shown that these values are subject to time and space organization in both a plant cell and solutions of cellular components and that the hydrating molecules of water are in continuous thermal motion on the surface of hydrophilic compounds.--Copyright 1972, Biological Abstracts, Inc.
W73-06644

AVAILABILITY OF WATER TO PLANTATIONS OF PINE ON SANDY SOILS OF THE ARCHEDA REGION (VLAGOOBEAPEOHENNOST; SOSNOVYKH KUL'TUR NA PESCHANYKH POCHVAKH NA ARCHEDINSKIKH PESKAKH),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 02G.
W73-06987

HYDRIC CONDITIONS, A FACTOR LIMITING RADIAL GROWTH OF FIR TREES, (IN RUMANIAN),
C. Bindiu.
Rev Roum Biol Ser Bot. Vol 16, No 6, p 405-412. 1971. Illus. English summary.
Identifiers: *Fir-G, *Growth (Radial), Hydric conditions, Moisture, Soils, Trees.

The cumulative radial growth of the fir from 110-yr-old stand, situated at an altitude of 80 m, on an acid brown forest soil is presented. The occurrence of a hydric deficit in the soil affected the current year's growth and that of the following year. Because of losses by respiration (equal to about 15% of the width of the annual ring) an early recuperation period of growth was necessary. The effective growth increase was produced later, at the beginning of May of the following year, although photosynthesis occurred also in winter (Feb.-March).--Copyright 1972, Biological Abstracts, Inc.
W73-07089

EFFECT OF MOISTURE STRESS AT DIFFERENT STAGES OF GROWTH: II. CYTOPLASMIC MALE-STERILE CORN,
Iowa State Univ., Davenport. Cooperative Extension Service.
For primary bibliographic entry see Field 03F.
W73-07117

THE INITIAL LEACHING OF HAYED-OFF PASTURE PLANTS IN RELATION TO THE RECYCLING OF PHOSPHORUS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
S. M. Bromfield, and O. L. Jones.
Australian Journal of Agricultural Research, Vol 23, No 5, p 811-824. September 1972, 3 fig, 7 tab, 13 ref.

Descriptors: *Leaching, *Pastures, *Recycling, *Phosphorus, *Ion transport, Rainfall, Clovers, Fertilizers, Plant populations, Soil-water-plant relationships, Spring, Laboratory tests, Rates, Nitrogen, Simulated rainfall, Solubility, Diffusion, Plant tissues, Microbial degradation, Plant growth regulators, Soil chemical properties, Salt balance, Arid lands, Semiarid climates.
Identifiers: *Immobilization, *Australia, Phalaris.

Little is known about the rate and extent of phosphorus leaching from the pastures in the southern half of Australia in relation to phosphorus recycling in the spring. This laboratory study is concerned with factors which may affect rate and extent of phosphorus leaching from plants by the first rains following haying off. Hayed-off phalaris and clover plants of various nitrogen (N) and phosphorus (P) contents were leached under a wide range of controlled laboratory conditions to simulate various first rainfalls following haying off. Most of the total P in ground plant material was inorganic and 60-83 percent was water soluble. Continuous leaching (24, 4 cm rains) were required to leach more than 90 percent of the water-soluble P from samples of whole plant material. Leaching rates equivalent to 1, 25 cm rain over 96 hours were effective and removed up to 62 percent P. Percentage of P leached at low intensities up to 4 days varied, and depended on rate and extent of microbial conversion of inorganic K to water-insoluble forms, percentage of soluble P immobilized increased as N/P ratio of samples increased. Results are discussed in relation to phosphorus recycling in pastures. Leaching of P from plants depends at first on rate of P solution and diffusion through plant tissues; for the next 48-192 hours, it depends on rates of microbial formation of insoluble P and release of P by solution and diffusion. In the short term, recycling of water-soluble P in pasture residues will not greatly decrease the fertilizer P requirement of pasture on phosphate-responsive soils. (Popkin-Arizona)
W73-07118

THE EFFECT OF CONTAINER POROSITY ON ROOT ENVIRONMENT AND PLANT GROWTH. II. WATER RELATIONS,
Agricultural Research Council, Littlehampton (England). Glasshouse Crops Research Inst.
For primary bibliographic entry see Field 02D.
W73-07124

NOTE OF THE GROWTH OF RHIZOBIUM STRAINS OF DHAINCHA (SESBANIA CANNABINA (RETZ.) PERS.) IN A SALINE-ALKALI SOIL,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 03C.
W73-07125

NITROGEN FERTILIZATION AND CLIPPING EFFECTS ON GREEN NEEDLEGRASS (STIPA VIRIDULA TRIN.):II EVAPOTRANSPIRATION, WATER USE EFFICIENCY, AND NITROGEN RECOVERY,
Montana State Univ., Bozeman. Dept. of Agronomy.
For primary bibliographic entry see Field 02D.
W73-07128

SOME COUNTERACTIVE EFFECTS OF ANTITRANSPIRANTS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 02D.
W73-07139

2J. Erosion and Sedimentation

BONDING OF WATER TO PEAT AND THE EFFECT OF MECHANICAL WORKING,
Department of Scientific and Industrial Research, Lower Hutt, (New Zealand). Soil Bureau.
For primary bibliographic entry see Field 02G.
W73-06706

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, GREEN CREEK, BRAZOS RIVER BASIN, TEXAS, 1955-66,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W73-06720

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: I. POTASSIUM REMOVAL BY SODIUM CHLORIDE AND SODIUM TETRAPHENYLBORON SOLUTIONS,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
For primary bibliographic entry see Field 02K.
W73-06730

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: II. RATES OF DISSOLUTION IN 0.1, 0.01, 0.001M HCL,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
For primary bibliographic entry see Field 02K.
W73-06731

MATHEMATICAL EVALUATION OF FACTORS AFFECTING GULLY STABILITY,
Agricultural Research Service, Columbia, Mo.
J. M. Bradford, D. A. Farrell, and W. E. Larson.
Soil Science Society of America Proceedings, Vol 37, No 1, p 103-107, January-February 1973. 4 fig, 4 tab, 12 ref.

Descriptors: *Gully erosion, *Slope stability, *Loess, *Soil erosion, Gullies, Aeolian soils, Soil mechanics, Soil water, Soil water movement, Cohesive soils, Infiltration.

The factors influencing the stability of gully banks in loess were studied by considering the action of forces within the soil mass forming the wall of the gully. A two-dimensional stability analysis was made using the Simplified Bishop Method. If the angle of internal friction is less than or equal to 35 deg, vertical, saturated, or near-saturated gully walls in loessial soils will fail if a groundwater table exists at the base of the wall and if the cohesion for the saturated soil system is zero at a hydrostatic pressure of zero. Although gully bank stability is sensitive to the angle of internal friction, the calculated stability is relatively insensitive to slope height and soil bulk density. Tension cracks that frequently open at some distance back from the gully face do not materially influence stability. The effect of infiltration rate into the soil on the stability of the gully wall depends upon the rate of water conductivity through the soil and upon the cohesion of the soil or the level of the groundwater table. Increasing the infiltration rate decreases the stability. (Knapp-USGS)
W73-06733

THE ROLE OF HUMIC ACIDS FROM TASMANIAN PODZOLIC SOILS IN MINERAL DEGRADATION AND METAL MOBILIZATION,
Department of Mines, Hobart (Australia).
W. E. Baker.
Geochimica et Cosmochimica Acts, Vol 37, No 2, p 269-281, February 1973. 2 fig, 8 tab, 36 ref.

Descriptors: *Leaching, *Humic acids, *Weathering, *Mineralogy, *Forest soils, Metals, Sulfates, Chemical degradation, Trace elements, Heavy metals, Copper, Lead, Iron, Gold.
Identifiers: *Tasmania, Silver.

Humic acid extracted from a podzolic soil in northwestern Tasmania exhibits very strong solvent activity towards a number of minerals and metals. Some correlation was found between relative bond strengths of sulfides and their degradation by humic acids. Many metal humates display low solubility in water, but they are readily mobilized in the presence of humic acids. Humic acids developed under varying vegetation in a cool temperate climate are potentially very powerful solvents in the weathering cycle. Their ability to mobilize precipitated metal humates suggests that classical concepts of relative metal mobility may

need modification in environments where appreciable concentrations of these substances are found. (Knapp-USGS)
W73-06734

ORGANIC CARBON ISOTOPE RATIOS IN QUATERNARY CORES FROM THE GULF OF MEXICO,
Texas Univ., Port Aransas. Inst. of Marine Science.
J. W. Newman, P. L. Parker, and E. W. Behrens.
Geochimica et Cosmochimica Acta, Vol 37, No 2, p 225-238, February 1973. 8 fig, 1 tab, 18 ref. NSF Grant GA-11414.

Descriptors: *Gulf of Mexico, *Bottom sediments, *Carbon, *Stable isotopes, *Provenance, Organic matter, Pleistocene epoch, Quaternary period, Sampling, Sedimentation, Stratigraphy.

All of the major deep-water sedimentary provinces of the Gulf of Mexico were sampled with 48 piston cores, representative of the late Quaternary. The organic carbon in the sediment was measured at intervals within each core. Graphs of delta (per mil deviations from the carbon isotope ratio of National Bureau of Standard Isotope Reference Material NBS-20) C13 versus depth for each core give an indication of the sedimentological history of the Gulf. They show the extent of terrestrial influence on the Gulf during the late Pleistocene. Changes in delta C13 of up to 0.6% were measured across the Pleistocene-Holocene boundary in cores from the abyssal plain. Varying amounts of land-derived organic carbon were transported to the Gulf basin during glacial periods. By comparing graphs for cores from different areas, it was concluded that the major parameter affecting the delta C13 values of organic carbon from marine sediments is the relative amount of terrestrial material present in the sediment. The maximum possible effect of the Pleistocene-Holocene temperature change in the Gulf was determined to be about 0.1%, if such an effect occurs at all. (Knapp-USGS)
W73-06735

CHANNEL CHANGES OF THE GILA RIVER IN SAFFORD VALLEY, ARIZONA, 1846-1970,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 08B.
W73-06737

ARSENIC INTERFERENCE IN THE DETERMINATION OF INORGANIC PHOSPHATE IN LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05A.
W73-06750

DENITRIFICATION AND NITRATE REDUCTION IN WISCONSIN LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W73-06751

PROBLEMS IN RIVER HYDROLOGY AND FLOW DYNAMICS (VOPROSY GIDROLOGII REK I DINAMIKI POTOKOV).
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).

Trudy, No 32 (38), Khmaladze, G. N., editor, Leningrad, 1969. 166p.

Descriptors: *Hydrology, *Hydraulics, *Hydrodynamics, *Flow, *Sedimentation, Sediments, Mudflows, Particle size, Suspended load, Turbidity, Discharge (Water), Waves (Water), Rivers, Channels, Ice, Meteorology, Orography, Drainage systems, Forecasting, Equations.
Identifiers: *USSR, *Transcaucasia, Mudflow traps, Radiometry, Kinematics.

This collection of 13 papers deals with various aspects of mountain-stream hydrology, including methods for forecasting maximum water discharges, suspended-sediment concentrations, and mudflow hazard as well as radiometric techniques used for investigation of sedimentation at the mouth of the Kura River in Transcaucasia. Formation of slush ice on the Araks and Akhuryan Rivers in Armenia and aggressiveness of river waters in the Georgian Republic are examined together with kinematic characteristics of the bottom layer of flows in the presence of surface waves, hydraulics of sediment-carrying flows in channels with deformed boundaries, and transformation of surface waves in flows of variable depth. Laboratory investigations of the drag coefficient of mudflow control structures designed by the Transcaucasian Hydrometeorological Research Institute also are reported. (See W73-06802 thru W73-06808) (Josefson-USGS)
W73-06801

HYDROLOGIC NATURE OF MUDFLOWS IN ARMENIA AND A METHOD FOR FORECASTING MUDFLOW HAZARD (GIDROLOGICHESKAYA PRIRODA SELEY V ARMYANSKOY SSR I METOD PROGNOZA SELEOPASNOSTI),
A. I. Zak.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 3-13, Leningrad, 1969. 5 fig, 2 tab, 6 ref.

Descriptors: *Hydrology, *Orography, *Mudflows, *Forecasting, River basins, Drainage area, Discharge (Water), Rainfall-runoff relationships, Runoff coefficient, Time lag, Antecedent moisture content, Equations.
Identifiers: *USSR, *Armenia.

Methods are developed for forecasting mudflow hazard and maximum water discharges of mudflows in mudflow basins of the Debet and Dzoraget Rivers in Armenia. Based on the predictive relations obtained, mudflow hazard and magnitude of mudflow discharge can be calculated or forecast to within plus or minus 10%-25%. (See also W73-06801) (Josefson-USGS)
W73-06802

SOME PROBLEMS OF MUDFLOW FORMATION IN TRANSCAUCASIAN RIVERS WITH HIGH MUDFLOW ACTIVITY (NEKOTORYYE VOPROSY FORMIROVANIYA SELEY NA SELEAKTIVNYKH REKAKH ZAKAVKAZ'YA),
M. A. Zakhashvili.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 14-21, Leningrad, 1969. 4 tab, 4 ref.

Descriptors: *Mudflows, *Erosion, *Rivers, *River basins, Meteorology, Precipitation (Atmospheric), Temperature, Fluctuations.
Identifiers: *USSR, *Transcaucasia.

Investigations of mudflows on Transcaucasian rivers were based on data on mudflow activity in the Durudzhi River basin in eastern Georgia, the Selav-Mastara River basin in Armenia, and the Kishchay River basin in Azerbaydzhan. Meteorological factors are especially important in determining the accumulation of primary mudflow material in basins where mudflow activity is high. Sharp temperature fluctuations should be used as an index of mudflow accumulation, while uniform distribution of precipitation during the 20 days preceding a mudflow is a good indicator of mudflow hazard, provided total precipitation during this period is equal to, or greater than, the long-term average. (See also W73-06801) (Josefson-USGS)
W73-06803

A CONTRIBUTION TO THE METHOD OF PREDICTING WATER TURBIDITY (K METODIKE PROGNOZA MUTNOSTI VODY),
G. N. Khmaladze.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 40-47, Leningrad, 1969. 5 fig, 1 tab.

Descriptors: *Forecasting, *Turbidity, Suspension, Suspended solids, Suspended load, Sediment discharge, Discharge (Water), Floods, Precipitation (Atmospheric), Equations.
Identifiers: *USSR, *Kura River.

A method was developed for forecasting daily turbidity of water in the Kura River at the town of Rustavi, based on observations of water turbidity at Tbilisi. A relation was established between water discharges at the two points for a 24-hour forecast of water discharge at Rustavi from the discharge at Tbilisi. A sediment discharge-streamflow relationship curve was used to determine sediment discharge at Rustavi, and water turbidities at the town were calculated from known sediment and water discharges. The method is effective in 66% of the cases. (See also W73-06801) (Josefson-USGS)
W73-06804

DETERMINATION OF COARSE-SEDIMENT GRAIN-SIZE DISTRIBUTION (OTSENKA GRANULOMETRICHESKOGO SOSTAVA KRUPNYKH NANOSOV),
Z. D. Kopaliani.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 58-67, Leningrad, 1969. 3 fig, 2 tab, 12 ref.

Descriptors: *Coarse sediments, *Particle size, *Analytical techniques, Bottom sediments, Gravels, Discharge (Water), Orography, Equations.
Identifiers: *USSR.

Available methods for determining the theoretical diameter and grain-size distribution of coarse sediments are presented together with the advantages of selecting the maximum diameter. A linear relationship was established between typical diameters by plotting grain-size distribution curves for 4 samples using gravimetric and quantitative techniques. (See also W73-06801) (Josefson-USGS)
W73-06805

KINEMATIC STRUCTURE OF THE BOTTOM LAYER OF FLOW IN THE PRESENCE OF SURFACE WAVES (O KINEMATICHESKOY STRUKTURE PRIDONNOGO SLOYA POTOKA PRI NALICHII POVERKHNOSTNYKH VOLN),
V. I. Vinogradova, and Ye. I. Mass.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 79-91, Leningrad, 1969. 6 fig, 1 tab, 6 ref.

Descriptors: *Fluid mechanics, *Flow, *Turbulence, *Waves (Water), Velocity, Roughness (Hydraulic), Flumes, Current meters, Floats, Films, Equations.
Identifiers: *USSR, *Kinematics, Oscillograms.

Turbulence of wave and mixed flows was investigated in flume experiments on the kinematic structure of the bottom layer of a flowing liquid and a liquid at rest during propagation of progressive surface waves. Current meters, floats, and motion pictures (24 to 64 frames per second) were used to measure velocities. From an analysis of experimental data, a formula was derived for bottom velocity of mixed flow and for change in intensity of turbulent wave and channel flows during their interaction. (See also W73-06801) (Josefson-USGS)

W73-06806

HYDRAULIC EQUATIONS OF SEDIMENT-CARRYING FLOWS IN CHANNELS WITH DEFORMED BOUNDARIES (URAVNENIYA GIDRAVLIKI NANOSONESUSHCHIKH POTOKOV V RUSLAKH S DEFORMIRUYEMYMI GRANITSAMI),
T. G. Voynich-Syanozhentskiy.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 92-131, Leningrad, 1969. 3 fig, 24 ref.

Descriptors: *Hydraulics, *Equations, *Sediments, *Channels, *Flow, Turbulence, Turbulent flow, Hydraulic jump, Reynolds number, Chezy equation, Hydrodynamics, Friction, Diffusion, Suspended load, Avalanches, Mudflows.
Identifiers: *USSR, Dispersoids.

Hydraulic equations of a sediment-carrying flow in a channel with deformed boundaries were derived from general hydraulic equations of two-component flows. The system of equations obtained, which is a generalization of the St. Venant and Boussinesq equations for sediment-carrying flows, can also apply to flows saturated with sediments. The hydraulic equations can be applied to avalanche-type flows (mudflows) by introducing the Coloumb friction. Examples of density flows are used to illustrate the possible application of simplified versions of the equations derived. (See also W73-06801) (Josefson-USGS)
W73-06807

LABORATORY INVESTIGATIONS OF THE DRAG COEFFICIENT OF MUDFLOW CONTROL STRUCTURES OF THE TYPE DESIGNED BY THE TRANSCAUCASIAN HYDROMETEOROLOGICAL RESEARCH INSTITUTE (LABORATORNYYE ISSLEDOVANIYA KOEFFITSIYENTA LOBOVOGO SOPROTIVLENIYA PROTIVOSELEVYKH SOORUZHENIY SISTEMY ZAKNIGMI),
V. I. Vinogradova, G. I. Kherkheulidze, and V. K. Oganyan.
In: Voprosy gidrologii rek i dinamiki potokov; Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 32 (38), p 150-161, Leningrad, 1969. 4 fig, 4 tab, 4 ref.

Descriptors: *Mudflows, *Control structures, *Design, *Design data, *Drag, Flow resistance, Dynamics, Hydrodynamics, Flow, Turbulent flow, Reynolds number, Boundary layers, Velocity, Model studies, Equations.
Identifiers: *USSR, *Mudflow traps, Aerodynamics.

To determine the dynamic action of flow on perforated mudflow traps built to the design of the Transcaucasian Hydrometeorological Research Institute, it is necessary to know the drag coefficient of the structure. Since the structure is an assembly of nonstreamlined bodies, the drag coefficient can only be determined by experiment. Tests were conducted on 1:25 and 1:50 scale models of one-, two-, three- and four-step structures placed in a turbulent flow, in a basin, and in an air tunnel. In a nonturbulent, free flow in the basin and in the turbulent-free air tunnel no scale effect was found, and the coefficient of streamlining was 0.5-0.6, regardless of the type of structure and the number of steps. In a turbulent flow, if the structure completely divides the river, the drag coefficient is assumed to be 1.5-1.6. (See also W73-06801) (Josefson-USGS)
W73-06808

HOLOCENE CONTINENTAL SEDIMENTATION IN THE SALTON BASIN, CALIFORNIA: A RECONNAISSANCE,
Shell Oil Company, Denver, Colo.
P. C. Van de Kamp.
Geological Society of America Bulletin, Vol 84, No 3, p 827-848, March 1973. 15 fig, 5 tab, 27 ref.

Descriptors: *Sedimentation, *Recent epoch, *Provenance, *California, Sediment transport, Alluvium, Sedimentology, Sedimentation rates, Sediment distribution, Dunes, Sampling, Salinity, Braiding, Terraces (Geologic).
Identifiers: *Salton basin (Calif).

The Salton Basin of southern California has been filling with a complex series of continental clastic deposits in late Pleistocene and Holocene time. The Holocene deposits are estimated to be up to 60 to 100 m thick. Two major sources supply sediment to the basin. The Colorado River has intermittently flowed into the southern part of the basin and deposited sand and mud in deltaic and lacustrine facies. Sediment derived from sources at basin margins is deposited in alluvial fans, braided streams, barrier beaches, and lacustrine beds. Sands from both sources have been reworked into extensive aeolian deposits. The lacustrine muds and silts form an extensive central deposit with which all other facies interfinger or are deposited upon. Abrupt facies changes are common. The sands from the two major source areas are compositionally distinctive. The Algodones Dunes are derived from Colorado River sands. (Knapp-USGS)
W73-06821

TREND SURFACE ANALYSIS OF FLOOD PLAIN AND ALLLUVIAL TERRACES IN SOUTHERN ILLINOIS AND WESTERN KENTUCKY,
Illinois Univ., Urbana. Dept. of Geography.
C. S. Alexander, and J. R. Eyton.
Geological Society of America Bulletin, Vol 84, No 3, p 1069-1073, March 1973. 4 fig, 1 tab, 11 ref.

Descriptors: *Geomorphology, *Flood plains, *Terraces (Geologic), Alluvium, Alluvial channels, Ohio River, Lakes, Statistical methods.
Identifiers: Trend surface analysis.

First-degree trend surfaces were fitted to the elevations from the flood plain and two terrace surfaces along both sides of the lower Ohio Valley between New Liberty and Cairo, Illinois, in an attempt to determine whether the terraces are of fluvial or lacustrine origin. The results suggest that the lower terrace is the result of stream deposition, whereas the higher appears to be due to lake deposition. (Knapp-USGS)
W73-06822

EXPERIMENTAL DEVELOPMENT OF HEADWARD GROWTH OF CHANNEL NETWORKS,
State Univ. of New York, Binghamton. Dept. of Geology.
For primary bibliographic entry see Field 08D.
W73-06823

SHOALING OF SPIRAL WAVES IN A CIRCULAR BASIN,
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
C. C. Mei.
Journal of Geophysical Research, Vol 78, No 6, p 977-980, February 20, 1973. 1 fig, 4 ref.

Descriptors: *Waves (Water), *Surf, *Beaches, *Littoral drift, *Hydraulic models, Mathematical studies, Beach erosion, Hydraulic similitude, Laboratory tests.

For studies of beach erosion and littoral drift, spiral waves may be generated on the periphery of a cylindrical drum located at the center of a large circular tank. If a beach is built along the periphery of the tank, the approaching waves resemble a plane wave train obliquely incident to a long straight beach. Sidewall effects usually encountered in rectangular tanks can be eliminated. For versatility the wavemaker should be designed to give in appreciable range of obliqueness. This range may be achieved in principle by designing proper angular modulation on the drum. Shoaling formulas are given for a spiral wave generated in a basin with circular contours. Differences with rectilinear beaches are discussed. (Knapp-USGS)
W73-06827

CURRENTS ALONG FLOORS OF SUBMARINE CANYONS,
Scripps Institution of Oceanography, La Jolla, Calif.
F. P. Shepard, and N. F. Marshall.
American Association of Petroleum Geologists Bulletin, Vol 57, No 2, p 244-264, February 1973. 18 fig, 2 tab, 10 ref. NSF Contract GA-19492 ONR Contract Nonr-2216 (23).

Descriptors: *Submarine canyons, *Currents (Water), *Sediment transport, California, Erosion, Turbidity currents, Waves (Water), Tides, Tidal effects, Sedimentation, Current meters, Data collections.

Currents along the floors of submarine canyons off California and Baja California were recorded. Currents of less than 50 cm/sec alternate between upcanyon and downcanyon directions at periods ranging from about 20 minutes to more than 12 hours. In general, the longer periods, some of them related to tides, are found at the deeper stations (more than 250 m), but shorter periods probably related to internal waves, predominate at the shallower stations. In all but 4 of 45 recordings in canyons, the net movement was found to be downcanyon. Velocities usually are higher in downcanyon flows, and the duration of flow usually is longer. These currents have sufficient velocity during the peaks of many flows to transport sand in appreciable quantities. Velocities are at least as high at the deep as at the shallow stations in the same canyon. Variation in wind and wave conditions has little effect on currents except during major storms. More powerful currents operate at rare intervals along the canyons. (Knapp-USGS)
W73-06833

INFLUENCE OF TEXTURE ON POROSITY AND PERMEABILITY OF UNCONSOLIDATED SAND,
Shell Oil Co., Midland, Tex.
For primary bibliographic entry see Field 02G.
W73-06835

VARIATIONS IN MORPHOLOGY OF MAJOR RIVER DELTAS AS FUNCTIONS OF OCEAN WAVE AND RIVER DISCHARGE REGIMES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02L.
W73-06836

REGIONAL SHELF STUDIES--A GUIDE TO ENGINEERING DESIGN,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W73-06839

CONTENT AND COMPOSITION OF AMINO ACIDS IN WATER, SUSPENDED MATTER, SEDIMENTS, AND OOZE SOLUTIONS FROM THE BLACK SEA (SODERZHANIYE I SOSTAV AMINOKISLOT V VODE, VZVESI, OSADKAKH I GRUNTOVYKH RASTVORAKH CHERNOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 05A.
W73-06846

MAGNESIUM-IRON REPLACEMENT IN CLAY MINERALS IN ANOXIC MARINE SEDIMENTS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 05A.
W73-06885

THE SURFICIAL SEDIMENTS OF LAKE HURON,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
R. L. Thomas, A. L. Kemp, and C. F. M. Lewis.
Canadian Journal of Earth Sciences, Vol 10, No 2, p 226-271, February 1973. 24 fig, 12 tab, 34 ref.

Descriptors: *Bottom sediments, *Lake Huron, Mud, Till, Galcial drift, Sands, Clays, Distribution patterns, Sedimentology, Sedimentation, Stratigraphy, Provenance, Sampling.

Three major sedimentary units are recognized in the main basin of Lake Huron: (1) glacial till and bedrock; (2) glaciolacustrine clay; and (3) postglacial mud. A bedrock escarpment divides Lake Huron into two distinct morphological regions. To the south of the escarpment, the lake has a gentle topography. To the north of the major escarpment, the lake is much deeper and has a complex bottom topography. The inshore region of Lake Huron and the two escarpments are composed of glacial till and bedrock. The till is overstepped in the deeper water by glaciolacustrine clays which are themselves overstepped by postglacial muds. Postglacial mud accumulation is continuous in the southern basins due to the gentle relief of the lake bottom. In the northern region of the lake, mud accumulation is discontinuous due to the undulating nature of the lake bottom. Quartz content is greatest in the coarser inshore sediments while clay minerals and (or) organic carbon are greatest in the finer offshore sediments. The sediments of the southern basin are derived predominantly from glacial tills whereas the composition of the sediments of the northern basin has been substantially modified by dilution with reworked glaciolacustrine clays. (See also W73-06957) (Knapp-USGS)
W73-06956

THE DISTRIBUTION OF MERCURY IN THE SURFICIAL SEDIMENTS OF LAKE HURON,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 05B.
W73-06957

SEDIMENT DISCHARGED FROM CANADIAN BASINS INTO LAKE ONTARIO,
Queen's Univ., Kingston (Ontario). Dept. of Geography.
E. D. Ongley.
Canadian Journal of Earth Sciences, Vol 10, No 2, p 146-155, February 1973. 6 fig, 2 tab, 8 ref.

Descriptors: *Sediment yield, *Lake Ontario, *Canada, Sediment load, Provenance, Erosion, Sedimentation, Suspended load, Dissolved solids, Statistics, Data collections, Soil erosion, Water quality.

Regional patterns of sediment yield from Canadian watersheds tributary to Lake Ontario were obtained by using suspended and dissolved sediment and flow data originally obtained by government agencies for other purposes. The mean annual dissolved load of 358.6 tons per square mile per year for the 52 basins is approximately three times larger than that predicted for basins with a comparable mean annual runoff of approximately 12 in. The high dissolved load component is attributable to the limestone and dolomite basement of most of the area, and to the carbonate content in the tills of Southern Ontario. Dissolved sediment yield bears a closer relationship to drainage area than to relief. Suspended sediment yield is more closely associated with relief, because suspended sediment is derived from surface erosion. Dissolved load originates primarily from interflow and groundwater. Although the mean denudation rate corresponds with the present rate for similar United States basins, greater sediment discharge occurred with deforestation during the colonial period of Southern Ontario. (Knapp-USGS)
W73-06958

GEOMORPHOLOGY AND GEOCHEMISTRY OF A GYPSUM KARST NEAR CANAL FLATS, BRITISH COLUMBIA,
Waterloo Univ. (Ontario). Environmental Fluid Mechanics Lab.
T. M. L. Wigley, J. J. Drake, J. I. Qunlan, and D. C. Ford.
Canadian Journal of Earth Sciences, Vol 10, No 2, p 113-122, February 1973. 5 fig, 1 tab, 34 ref. Canada NRC Grant A5141.

Descriptors: *Karst, *Gypsum, *Canada, *Karst hydrology, Leaching, Water chemistry, Geomorphology, Glacial drift, Sinks, Springs, Geochemistry, Topography.
Identifiers: *Canal Flats (British Columbia).

A karst topography is developed on a thick series of gypsum beds in the Burnais and Harrogate Formations (Middle Devonian) in a belt 60 miles long in the Kootenay Ranges, British Columbia. Karst features in the area include collapse sinkholes (some of which are ponded), springs and related ponors, caves, tufa deposits, geological organs, and solution breccias. Thirty-nine water samples from different hydrological situations in the two valleys were analyzed for solute concentration. Stepwise linear discriminant function analysis of the data revealed five distinct classes of water with calcium concentration, temperature, and the degree of saturation with respect to gypsum as the principal distinguishing variables. Modern groundwater flow in the area is mainly through carbonate rather than the sulfate strata. Particular springs of high sulfate content indicate the proximity of the base of the gypsum. Hydrological and geochemical evidence suggest that sinkholes develop preferentially near the upper and lower contacts of the gypsum subcrop. These indicators may be used for mapping drift-mantled gypsum deposits. (Knapp-USGS)
W73-06960

PRECIPITATION OF SECONDARY CALCITE IN GLACIER AREAS; CARBON AND OXYGEN ISOTOPIC COMPOSITION OF CALCITES FROM MT. HERMON, ISRAEL, AND THE EUROPEAN ALPS,
Weizmann Inst. of Science, Rehovoth (Israel). Isotope Dept.
M. Magaritz.
Earth and Planetary Science Letters, Vol 17, No 2, p 385-390, January 1973. 1 fig, 2 tab, 22 ref.

Descriptors: *Calcite, *Glaciation, *Chemical precipitation, *Stable isotopes, Provenance, Oxygen isotopes, Carbon dioxide, Weathering, Leaching, Water chemistry.
Identifiers: Carbon isotopes.

Secondary calcites from Mount Hermon, Isreael can be separated into two groups based on their carbon and oxygen composition. The first group has the usual isotopic composition of secondary calcites which are precipitated from waters having the isotopic composition of recent groundwaters in the region. The second group is characterized by high C-13 and low O-18 values. Secondary calcites from the European Alps show isotopic compositions which are similar to this second group. These calcites are formed by precipitation from snowmelt waters. The unusual isotopic composition of carbon and oxygen in the second group of secondary calcite may be explained by a model that describes the condition in which carbonate in glaciated areas precipitates. Since there is general similarity between the isotopic composition of carbonates from the Alps and from the Hermon, a single model should explain both sets of data. The only system where carbonate has C-13 values as high as plus0.5 is a system where the CO2 is of atmospheric origin and there is little or no addition of CO2 from the soil. One area with fresh water without any soil CO2 is a high mountain glaciated area. In such an area are many places without soil cover where melt water can equilibrate with air CO2 and dissolve CaCO3; if these melt waters then penetrate into rocks they may precipitate CaCO3 wherever a change in temperature occurs when they are concentrated through evaporation. This model explains first the low and variable value of the O-18 of the carbonate, due to the variable values of O-18 in glacial melt waters maybe as a result of evaporation, and secondly, the high C-13 value which corresponds to the carbon isotopic composition of air CO2. (Knapp-USGS)
W73-06961

PERMEABILITY-POROSITY PATTERNS AND VARIATIONS IN SOME HOLOCENE SAND BODIES,
Cincinnati Univ., Ohio. Dept. of Geology.
W. A. Pryor.
American Association of Petroleum Geologists Bulletin, Vol 57, No 1, p 162-189, January 1973. 26 fig, 2 tab, 18 ref.

Descriptors: *Permeability, *Porosity, *Sands, *Sand bars, *Beaches, Dunes, Sandstones, Groundwater movement, Aquifer characteristics, Hydrogeology, Sedimentology, Sedimentation, Sedimentary structures, Oil reservoirs.

The combined processes of deposition, burial, compaction, diagenesis, and structural deformation yield final sandstone bodies of widely varied geometries, permeability-porosity characteristics, and structural configurations. In unraveling the evolution of sandstone aquifers it is necessary to have detailed knowledge of their initial depositional characteristics and of the postdepositional modifications impressed upon them. Permeability, porosity, and texture were studied in 992 oriented and undistrubed sand samples of river bars, beaches, and dunes. River point-bar samples average 93 darcys. Beach sand samples average 68 darcys. Permeability values in dune sands average 54 darcys. Permeability values in river-bar sands are extremely varied in comparision to those of beaches and dunes. In river bars, permeability decreases systematically downstream and bankward. Permeabilities on beaches are low on the beach faces, high on the beach crests, and variable on the beach-berm areas. Both river-bar and beach sands have well organized directional permeabilities, parallel with the length of river bars and perpendicular to the length of beaches. Dunes are characterized by low variability. In river-bar sands, permeability increases as grain sorting increases and porosity increases as grain size increases, just the opposite of the relations in dune sands. The cause of these deviations is the different style of grain packing in the river-bar sands. (Knapp-USGS)
W73-06965

FIELD CALIBRATION AND EVALUATION OF A NUCLEAR SEDIMENT GAGE,
Agricultural Research Service, Chickasha, Okla. Southern Great Plains Watershed Research Center.
N. H. Welch, and P. B. Allen.
Water Resources Research, Vol 9, No 1, p 154-158, February 1973. 3 fig, 2 tab, 8 ref.

Descriptors: *Suspended load, *Sediment load, *Gaging, *Gages, *Nuclear meters, Sampling, Calibrations, Instrumentation.
Identifiers: *Nuclear sediment gages.

Nuclear sediment gage readings were compared to stream cross-sectional sediment concentrations for several storm events over a 3-year period. Calibration curves, developed by least-squares analysis, are presented for individual and combined storm events. Correlation coefficients for individual or combined storm events ranged from minus0.86 to minus0.99, and all were significant at the 1% level. Standard errors of estimate ranged from plus minus 172 to plus minus 1884 ppm. Sediment concentrations predicted with the calibration curves developed in this study were accurate enough for most applications. Although the particular nuclear gage used is probably unsatisfactory for general use, the principle of monitoring sediment concentrations by nuclear techniques appears sound and feasible. (Knapp-USGS)
W73-06975

RATE AND EXTENT OF INORGANIC PHOSPHATE EXCHANGE IN LAKE SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05C.
W73-07022

FINAL REPORT, MEASUREMENT OF FLOOD FLOW AND SUSPENDED SEDIMENTATION BY RADIOISOTOPE METHOD,
Taiwan Power Co., Taipei.
For primary bibliographic entry see Field 02E.
W73-07051

YUKON RIVER: EVIDENCE FOR EXTENSIVE MIGRATION DURING THE HOLOCENE TRANSGRESSION,
Geological Survey, Falmouth, Mass.
H. J. Knebel, and J. S. Creager.
Science, Vol 179, No 4079, p 1230-1232, March 23, 1973. 1 fig, 18 ref.

Descriptors: *Deltas, *Sedimentation, *Alaska, *Stratigraphy, Alluvial channels, Coasts, Paleohydrology, Sea level, Pleistocene epoch.
Identifiers: *Yukon River (Alaska).

The Yukon River shifted during the Holocene sea-level transgression from south of Nunivak Island during the Wisconsin maximum to its present location (a distance greater than 300 kilometers). This is indicated by remanent channels, distinct sedimentary structures, deltaic sediments, and anomalous rates of sediment accumulation on the continental shelf of the east-central Bering Sea. In the Chukchi Sea to the north of Bering Strait there was no significant influence by sediment sources other than surrounding drainage basins until 11,000 to 13,000 years ago. At about that time, the sediments deposited in the southern Chukchi Sea were changed markedly by the introduction of quantities of silt-sized inorganic particles, which are most readily explained by a northward shift of the Yukon River to a position where its discharge of silt became a significant factor in the sedimentary environment of the Chukchi Sea. (Knapp-USGS)
W73-07053

FORESTS AND EROSION IN CHINA, 1922-1927,
W. C. Lowdermilk, and M. Chall.
Forest History, v 16, No 1, p 4-15, April 1972, 6 fig, 2 ref.

Descriptors: *Flood control, *Soil erosion, *Flood damage, *Rainfall-runoff relationships, *Silting, Rainfall intensity, Runoff, History, Dikes, Geomorphology, Aeolian soils, Measurements, Surveys, Instrumentation, Vegetation, Soil management, Drainage systems, Flood plains, Terracing.

This article is part of the memoirs of Walter C. Lowdermilk from an interview conducted by Malca Chall of the Regional Oral History Office of the Bancroft Library, Berkeley, California. The problems of soil erosion along the Yellow River are discussed. In 1852 the River broke its dikes and changed course by four hundred miles to empty to the Gulf of Chihli to the north instead of the Yellow Sea as a result of a flood which snuffed out millions of lives. The silt-laden dikes, known as 'China's Sorrow', are described. Aeolian soils from the Gobi Desert are the source of the silt. Runoff plots, rainfall and runoff measurements are described. Lowdermilk made regional explorations and surveys, taking physical measurements of rainfall and runoff with instruments developed by himself. A rainfall of twelve inches in thirty hours caused extensive erosion. Food crops are less effective than trees in erosion casued extensive erosion. Food crops are less effective than trees in erosion control. Concepts of soil conservation are noted. (Popkin - Arizona)
W73-07112

2K. Chemical Processes

EFFECT OF STRIP-MINING ON WATER QUALITY,
Ohio State Univ., Columbus. Water Resources Center.
For primary bibliographic entry see Field 05A.
W73-06515

FOURIER TRANSFORM SPECTROSCOPY. NEW METHODS DRAMATICALLY IMPROVE THE SENSITIVITY OF INFRARED AND NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY,
National Inst. of Arthritis, Metabolism and Digestive Diseases, Bethesda, Md.
E. D. Becker, and T. C. Farrar.
Science, Vol 178, No 4059, p 361-368, October 27, 1972. 12 fig, 21 ref.

Descriptors: *Interferometry, *Fourier analysis, *Molecular structure, *Methodology, *Spectrometers, Instrumentation, Nuclear magnetic resonance, Chemical analysis.
Identifiers: *Fourier transformation spectroscopy, Infrared spectroscopy, Sensitivity.

Recent advances in the study of structural molecular systems have been made possible in infrared and nuclear magnetic resonance spectrometry by the introduction of Fourier transform (FT) spectroscopy (interferometry or time-domain spectroscopy). Test times have been reduced by 5000 fold, and increases of 10-100 fold in sensitivity are reported. Reduction in time permits study of transient species or improvement of signal-to-noise ratio (S/N). Important applications, such as the NMR of low sensitivity, low abundance substances, e.g., C-13, have been made. Mathematical theory, pulse methods, and instrumental and computer requirements are presented in conjunction with application and measurements of the system. (Mackan-Battelle)
W73-06650

DETERMINATION OF TRACE AMOUNTS OF IRON (II) USING CHEMILUMINESCENCE ANALYSIS,
Federal Water Pollution Control Administration, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05A.
W73-06653

ANALYSIS OF BOTANICAL STANDARD REFERENCE MATERIALS BY CATHODE RAY POLAROGRAPHY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
E. J. Maienthal.
Journal of the Association of Official Analytical Chemists, Vol 55, No 5, p 1109-1113, September 1972. 6 tab, 16 ref.

Descriptors: *Chemical analysis, *Trace elements, *Pollutant identification, *Plant tissues, Nickel, Lead, Iron, Heavy metals, Aluminum, Separation techniques, Methodology, Aqueous solutions.
Identifiers: *Cathode ray polarography, *Standards, Bismuth, Sensitivity, Orchard leaves, Sample preparation, Detection limits.

The need for certified botanical and biological standards both in research and in industrial and field applications is leading to the development and production of a number of new Standard Reference Materials by the National Bureau of Standards. The first of these to be produced and certified is an orchard leaf standard. The determination of a number of important trace elements by cathode ray polarography was investigated and found to offer considerable advantages in sensitivity and accuracy over many other techniques. In addition, several elements may be determined simultaneously in the same solution. The methods were developed and applied to the analysis and certification of nickel, lead, bismuth, and iron in the orchard leaves. Results were also obtained for aluminum which has not yet been certified. Nickel was determined on 1 g samples after extraction with dimethylglyoxime and CHCl sub 3. Lead and bismuth were determined concurrently on 1 g samples after a sodium diethyldithiocarbamate separation. Iron and aluminum were determined on 0.25 g samples after cupferron separations. Details of the methods are given and the results are compared with those obtained by other techniques. (Byrd-Battelle)
W73-06658

SOME CHARACTERISTICS OF SEVERAL COMMERCIALLY AVAILABLE CATION--RESPONSIVE GLASS ELECTRODES,
Adelaide Univ. (Australia). Dept. of Physical and Inorganic Chemistry.
S. Phang, and B. J. Steel.
Analytical Chemistry, Vol 44, No 13, p 2230-2232, November 1972. 1 fig, 3 tab, 10 ref.

Descriptors: *Cations, *Physical properties, Electrical properties, Variability, Hydrogen ion concentration, Light intensity, Electrodes.
Identifiers: *Ion selective electrodes, *Glass electrodes, *Characterization, Activity coefficients, Silver electrodes.

Ten cation-responsive glass electrodes are characterized and the conditions necessary for such electrodes to be useful in the determination of activity coefficients are given. Solutions of reagent grade sodium chloride, nitric acid, and sodium hydroxide were used to test the electrodes. The electrodes were tested at 25C; each cell was magnetically stirred and only aged thermal electrolytic type Ag, AgCl electrodes were used. The response of the electrodes tested in reference to pH variations was consistent with the K sub HN sub a values found by earlier experimentation. Responses to light variations show that the effects of light on glass electrodes are serious when accurate activity coefficients are to be measured. (Holoman-Battelle)
W73-06665

N-CHLOROACETAMIDE AS A REDOX REAGENT. POTENTIOMETRIC DETERMINATION OF COMMON REDUCTANTS AND HYDRAZINES,
Punjabi Univ., Patiala (India). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-06677

EFFECT OF DEAD VOLUME ON EFFICIENCY OF A GAS CHROMATOGRAPHIC SYSTEM,
State Univ. of New York, Buffalo. Dept. of Chemistry.
V. Maynard, and E. Grushka.
Analytical Chemistry, Vol 44, No 8, p 1427-1434, July 1972. 13 fig, 5 tab, 27 ref.

Descriptors: *Gas chromatography, Efficiencies, *Laboratory equipment, Mathematical models, Tubes.
Identifiers: *Dead volume, Connecting tubes.

A systematic experimental study of the dead volume contribution of connecting tubes to the efficiency of a gas chromatographic system has been done. A system was built which had a minimum of dead volume. Various connecting tubes were installed at the injector and detector ends of 193.5 cm x 1/4-in. and 1/8-in. o.d. columns. The effects of diameter, total volume, and length of connecting tubes were determined for both columns. The results, while in general agreement with the theoretical results of others, indicate that in gas chromatography, pre-column dead volume can be a much more important contribution to the HETP than post-column dead volume. Also, lightly retained solutes are more sensitive to dead volume present in the system than are heavily retained solutes. In addition, the effect of the connecting tubings depends on the plate number generated in them. The practical implications of this study are important. When attaching the chromatographic system to post-column instrumentation, the requirements on the connecting tubes are not too stringent. On the other hand, the connecting tubes on the front end of the column should be as small as possible if the researcher is to obtain an efficient gas chromatographic system. (Little-Battelle)
W73-06679

THERMODYNAMICS OF SOIL WATER: I. THE ENERGY CONCEPT OF SOIL WATER,
National Inst. of Agricultural Science, Tokyo (Japan).
For primary bibliographic entry see Field 02G.
W73-06708

SIGNIFICANCE OF GROUND-WATER CHEMISTRY IN PERFORMANCE OF NORTH SAHARA TUBE WELLS IN ALGERIA AND TUNISIA,
Geological Survey, Washington, D.C.
F. E. Clarke, and B. F. Jones.
Available GPO, Washington, DC 20402 Price - 55 cents. Geological Survey Water-Supply Paper 1757-M, 1972. 39 p, 14 fig, 6 tab, 9 ref.

Descriptors: *Geochemistry, *Groundwater, *Water chemistry, *Well casings, *Corrosion, Pipes, Irrigation, Data collections, Sampling, Water analysis, Chemical analysis, Corrosion control, Water types, Water properties.
Identifiers: *Africa, *Algeria, *Tunisia.

Nine groundwater samples from the principal shallow and deep North Sahara aquifers of Algeria and Tunisia were examined to determine the relation of their chemical composition to corrosion and mineral encrustation thought to be contributing to observed decline in well capacities within a UNESCO/UNDP Special Fund Project area. Although the shallow and deep waters differ significantly in certain quality factors, all are sulfochloride types with corrosion potentials ranging from moderate to extreme. None appear to be sufficiently supersaturated with troublesome mineral species to cause rapid or severe encrustation of filter pipes or other well parts. However, calcium carbonate encrustation of deep-well cooling towers and related irrigation pipes can be expected because of loss of carbon dioxide and water during evaporative cooling. Both the shallow waters and the deep waters examined will tend to cause soil salinization because their salt contents are relatively high, and both have sodium absorption ratios which are unfavorable to sodium-sensitive soils and vegetation. Proper drainage and soil treatment are the only means of overcoming these problems during irriation. (Woodard-USGS)
W73-06715

PROPOSED WATER-RESOURCES STUDY FOR THE MADERA AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02F.
W73-06716

WATER RESOURCES AND GENERAL GEOLOGY OF GRANT COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 02E.
W73-06718

GROUND WATER IN DICKENS AND KENT COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-06719

A PH-DEPENDENT MODEL FOR THE CHEMICAL SPECIATION OF COPPER, ZINC, CADMIUM, AND LEAD IN SEAWATER,
Naval Undersea Center, San Diego, Calif.
A. Zirino, and S. Yamamoto.
Limnology and Oceanography, Vol 17, No 5, p 661-671, September 1972. 6 fig, 4 tab, 20 ref.

Descriptors: *Water chemistry, *Sea water, *Hydrogen ion concentration, Copper, Zinc, Cadmium, Lead, Trace elements, Chlorides, Sulfates, Bicarbonates, Carbonates, Alkalis (Bases), Aqueous solutions, Chemical potential, Polyelectrolytes, Solvation.

The speciation of divalent Cu, Zn, Cd, and Pb ions in seawater may be described using pH available and estimated thermodynamic stability constants, and individual ion activity coefficients. This model was used to calculate the degree of interaction between each of the metal ions and the anions Cl, SO4, HCO3, and OH as a function of pH. Interactions between a cation and an anion were assumed to result only in the formation of complexes with coordination numbers of 1 to 4; polynuclear and mixed-ligand complexes were not included in the model. All four metals are complexed to a considerable extent in seawater. With the exception of Cd, the distributions of chemical species of the metals vary greatly with changes in pH. Cu interacts primarily with OH and CO3, Zn with OH, Pb with CO3 and Cl, and Cd with Cl. Complexes with high coordination numbers are not formed to any appreciable extent in seawater. (Knapp-USGS)
W73-06725

CHLORIDE MOVEMENT IN UNDISTURBED SWELLING CLAY SOIL,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 02G.
W73-06729

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: I. POTASSIUM REMOVAL BY SODIUM CHLORIDE AND SODIUM TETRAPHENYLBORON SOLUTIONS,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
R. J. Gilkes, R. C. Young, and J. P. Quirk.
Soil Science Society of America Proceedings, Vol 37, No 1, p 25-28, January-February 1973. 6 fig, 1 tab, 17 ref.

Descriptors: *Leaching, *Potassium, *Weathering, Nutrients, Water chemistry, Mineralogy, Iron, Ion exchange, Cation exchange, Chemical degradation, Soil formation, Oxidation.
Identifiers: *Biotite.

The rate of leaching of interlayer potassium from biotite to NaCl and NaCl/sodium tetraphenylboron solutions is determined by the oxidation state of octahedral iron. Octahedral cation vacancies are generated when octahedral iron is oxidized, resulting in a change of orientation of hydroxyl from perpendicular to the mica layer to parallel. This in turn produces a more stable environment for interlayer potassium. Infrared absorption measurements show that the abundance of inclined hydroxyl bears a negative linear relation with the amount of potassium removed by leaching. (See also W73-06731) (Knapp-USGS)
W73-06730

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: II. RATES OF DISSOLUTION IN 0.1, 0.01, 0.001M HCL,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
R. J. Gilkes, R. C. Young, and J. P. Quirk.
Soil Science Society of America Proceedings, Vol 37, No 1, p 29-33, January-February 1973. 5 fig, 11 ref.

Descriptors: *Leaching, *Potassium, *Weathering, Nutrients, Water chemistry, Mineralogy, Iron, Ion exchange, Cation exchange, Chemical degradation, Soil formation, Oxidation.
Identifiers: *Biotite.

Rates of dissolution of biotite in 0.1-, 0.01-, and 0.001-M HCl decrease as the proportion of ferric iron in octahedrally coordinated sites increases. This is interpreted as being partly due to a decrease in the rate of K exchange from oxidized biotite so that a smaller surface area is exposed to acid attack. The availability of structural cations to plants growing on biotite rich soils will be a function of the oxidation state of structural iron in the biotite. (See also W73-06730) (Knapp-USGS)
W73-06731

THE ROLE OF HUMIC ACIDS FROM TASMANIAN PODZOLIC SOILS IN MINERAL DEGRADATION AND METAL MOBILIZATION,
Department of Mines, Hobart (Australia).
For primary bibliographic entry see Field 02J.
W73-06734

ORGANIC CARBON ISOTOPE RATIOS IN QUATERNARY CORES FROM THE GULF OF MEXICO,
Texas Univ., Port Aransas. Inst. of Marine Science.
For primary bibliographic entry see Field 02J.
W73-06735

MIXING MODEL PREDICTION OF FLUORIDE DISTRIBUTION IN CHESAPEAKE BAY,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-06813

ISOTOPIC COMPOSITION OF WATERS FROM THE DANAKIL DEPRESSION (ETHIOPIA),
Comitato Nazionale per le Ricerche Nucleari, Pisa (Italy). Laboratorio di Geologia Nucleare.
R. Gonfiantini, S. Borsi, G. Ferrara, and C. Panichi.
Earth and Planetary Science Letters, Vol 18, No 1, p 13-21, February 1973. 7 fig, 3 tab, 15 ref.

Descriptors: *Stable isotopes, *Water sources, *Oxygen isotopes, *Hot springs, Thermal water, Thermal springs, Water types, Structural geology, Geothermal studies, Brines, Saline water.

Identifiers: *Ethiopia, *Danakil depression (Ethiopia).

The water from Dallol hot springs in the Danakil depression of Ethiopia is enriched in 0-18 by isotopic exchange with the rocks. The process has been observed in many other geothermal areas of the world. The isotopic composition of the water of Lake Giulietti changes with depth, probably as a consequence of a seasonal stratification. The springs in the Lake Giulietti region contain waters which result from the mixing of local meteoric water with a brine, or with lake waters. (Knapp-USGS)
W73-06843

PHOSPHATE REMOVAL FROM SEA WATER BY ADSORPTION ON VOLCANOGENIC FERRIC OXIDES,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
R. A. Berner.
Earth and Planetary Science Letters, Vol 18, No 1, p 77-86, February 1973. 4 fig, 7 tab, 30 ref. Grants ONR (N00014-67A-0108-0004) NSF GA-29460.

Descriptors: *Phosphates, *Adsorption, *Water chemistry, *Iron compounds, *Sea water, Pacific Ocean, Iron, Bottom sediments, Chemical reactions, Iron oxides, Sampling, Geochemistry.

In some volcanogenic sediments from the East Pacific Rise, a good correlation was found between P205 and Fe203. Adsorption experiments and chemical analyses of deuterically altered and unaltered samples of submarine basalt strongly suggest that this association is due to the reaction of phosphate in sea water with poorly crystallized hydrous ferric oxides. The sediments adsorb far greater amounts of phosphate from sea water than sediments from other areas of the ocean. An appreciable proportion of dissolved phosphate delivered to the oceans by rivers is removed by volcanogenic iron oxides either as absorbed surface coatings or as discrete, but highly disordered, ferric phosphate phases. This process should be taken into consideration when considering oceanic phosphate budgets, both in the present and past oceans. (Knapp-USGS)
W73-06844

COPPER, BISMUTH, SILVER, LEAD, AND ZINC IN WATERS OF THE SUPERGENE ZONE (MED', VISMUT, SEREBRO, SVINETS I TSINK V VODAKH ZONY GIPERGENEZA),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Khimii.
For primary bibliographic entry see Field 05A.
W73-06845

CONTENT AND COMPOSITION OF AMINO ACIDS IN WATER, SUSPENDED MATTER, SEDIMENTS, AND OOZE SOLUTIONS FROM THE BLACK SEA (SODERZHANIYE I SOSTAV AMINOKISLOT V VODE, VZVESI, OSADKAKH I GRUNTOVYKH RASTVORAKH CHERNOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 05A.
W73-06846

MAGNESIUM-IRON REPLACEMENT IN CLAY MINERALS IN ANOXIC MARINE SEDIMENTS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 05A.
W73-06885

PYROLYTIC GRAPHITE-TUBE MICRO-FURNACE FOR TRACE ANALYSIS BY ATOMIC ABSORPTION SPECTROMETRY,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-06938

ESTIMATION OF FE (III) SPECTROPHOTOMETRICALLY BY 7-NITRO-8-QUINOLINOL-5-SULPHONIC ACID,
Gujarat Univ., Ahmedabad (India). University School of Sciences.
For primary bibliographic entry see Field 05A.
W73-06940

NITRATE ION SELECTIVE ELECTRODES BASED ON POLY (VINYL CHLORIDE) MATRIX MEMBRANES,
University of Wales Inst. of Science and Tech., Cardiff.
For primary bibliographic entry see Field 05A.
W73-06944

CHEMICAL EVOLUTION OF THE SYSTEM CALCITE-GYPSUM-WATER,
Waterloo Univ. (Ontario). Environmental Fluid Mechanics Lab.
T. M. L. Wigley.
Canadian Journal of Earth Sciences, Vol 10, No 2, p 306-315, February 1973. 5 fig, 15 ref, append. Canada NRC Grant A5141.

Descriptors: *Water chemistry, *Calcite, *Gypsum, *Chemical precipitation, *Aqueous solutions, Solubility, Geochemistry, Sulfates, Carbonates, Equilibrium, Chemical potential, Chemical reactions, Carbon dioxide.

The effect of the addition of gypsum to a solution of calcite in water (or the addition of calcite to a solution of gypsum in water) was determined theoretically for arbitrary temperature, carbon dioxide content, and degree of saturation with respect to calcite (or gypsum). The results can be used to study the chemical evolution of waters flowing through alternating gypsum and limestone strata, to predict conditions which will lead to the precipitation of calcite and/or gypsum, and to predict the chemical evolution of evaporating calcite-gypsum solutions. Under some circumstances, simultaneous gypsum (or calcite) precipitation and calcite (or gypsum) solution may occur. Coprecipitation of gypsum and calcite is unavoidable if a solution is evaporated to dryness, although the initial precipitate will be a single mineral. The methods used and many of the conclusions drawn are applicable to other systems of two or more minerals. (Knapp-USGS)
W73-06955

GEOMORPHOLOGY AND GEOCHEMISTRY OF A GYPSUM KARST NEAR CANAL FLATS, BRITISH COLUMBIA,
Waterloo Univ. (Ontario). Environmental Fluid Mechanics Lab.
For primary bibliographic entry see Field 02J.
W73-06960

PRECIPITATION OF SECONDARY CALCITE IN GLACIER AREAS; CARBON AND OXYGEN ISOTOPIC COMPOSITION OF CALCITES FROM MT. HERMON, ISRAEL, AND THE EUROPEAN ALPS,
Weizmann Inst. of Science, Rehovoth (Israel). Isotope Dept.
For primary bibliographic entry see Field 02J.
W73-06961

PB-210--RA-226: RADIOACTIVE DISEQUILIBRIUM IN THE DEEP SEA,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 05A.
W73-06962

LEACHING OF STRONTIUM-90 FROM SOIL BY SURFACE WATERS (VYMYVANIYE STRONTAIYA-90 IZ POCHVENNOGO POKROVA POVERKHNOSTNYMI VODAMI),
Institut Prikladnoi Geofiziki, Moscow (USSR).
For primary bibliographic entry see Field 02G.
W73-06981

LEACHING OF NITRATES IN DARK CHESTNUT SOIL OF ZAILISKI ALA TAU (O VYMYVANII NITRATOV V TEMNO-KASHTANOVOY POCHVE ZAILIYSKOGO ALATAU),
Kazakhskii Gosudarstvennyi Selskokhozyaistvennyi institut, Alma-Ata (USSR).
For primary bibliographic entry see Field 02G.
W73-06982

CONTRIBUTION TO THE THEORY OF THE FILTRATION EFFECT (K TEORII FIL'TRATSIONNOGO EFFEKTA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 02G.
W73-06984

THE STRUCTURE AND PROPERTIES OF WATER AND AQUEOUS SOLUTIONS,
IBM Research Lab., San Jose, Calif.
For primary bibliographic entry see Field 01B.
W73-07020

OPTICAL CONSTANTS OF WATER IN THE INFRARED,
Kansas State Univ., Manhattan.
A. N. Rusk, D. Williams, and M. R. Querry.
Journal of the Optical Society of America, Vol 61, No 7, p 895-903, July 1971.

Descriptors: *Refractivity, *Water properties, *Infrared, Reflectance, *Water analysis, *Optical properties.

The infrared reflectance of water in the region 5000-300 cm-1 has been measured at near-normal incidence and at an incidence angle of 53 deg. On the basis of the measured values of spectral reflectance and the existing data on spectral transmittance, values were obtained for the real and imaginary parts of the refractive index of water. The resulting values, which are presented in both graphical and tabular form, are compared with recent determinations by other investigators.
W73-07027

SPECTROPHOTOMETRIC DETERMINATION OF CHROMIUM WITH XYLENOL ORANGE AND METHYLTHYMOL BLUE,
Missouri Univ., Kansas City. Dept. of Chemistry.
K. L. Cheng.
Talantz, Vol 14, p 875-877, 1967. OWRR A-009-MO (4). 14-01-001-1393.

Descriptors: *Chromium, *Analytical techniques, Spectrophotometry, *Trace elements, *Chemical analysis.
Identifiers: EDTA, Xylenol orange, Methylthymol blue.

A new simple and sensitive method for determining traces of chromium is described. Xylenol orange and Chromium (III) form a red complex at pH3 on heating in boiling water for 20 min. The molar absorptivity is 19.0 x 1,000. No catalytic ac-

tion of the bicarbonate ion, carbon dioxide, or chromium (II) generated by metallic zinc was observed. Methylthymol blue is a less sensitive reagent for chromium, the molar absorptivity being 11.5 x 1,000.
W73-07028

FRESHWATER FERROMANGANESE CONCRETIONS: CHEMISTRY AND INTERNAL STRUCTURE,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 02H.
W73-07054

SIMULTANEOUS DETERMINATION OF ALUMINUM, COPPER, IRON, AND MANGANESE,
Bridgeport Univ., Conn. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-07102

CONTRIBUTION TO THE GEOCHEMISTRY OF THE GROUNDWATER IN MERSA MATRUH AREA (WESTERN MEDITERRANEAN COASTAL ZONE, EGYPT),
Egyptian Desert Inst., Cairo.
M. M. El-Shazly.
The Desert Research Bulletin, Vol 20, No 2, p 289-300. July 1970 (issued, February 1972). 4 fig, 4 tab, 9 ref.

Descriptors: *Geochemistry, *Water chemistry, *Chemical analysis, *Physicochemical properties, *Mineralogy, Groundwater, Arid lands, Regional analysis, Groundwater recharge, Meteorological data, Petrography, Physical properties, Sampling, Cations, Anions, Percolation, Paleosols, Hydrology, Mineral water.
Identifiers: *Egypt.

Mersa Matruh area occupies a portion of the Mediterranean Coastal Region situated about 290 km west of Alexandria. This area, lying within the rainy belt of Egypt, exhibits typical examples of the semi-arid nature of the landscape. The groundwater in this area depends totally on the local annual precipitation which is about 150 mm. This water is derived from rocky formations having different petrographic properties and belonging to different ages. The object was to reveal the chemical composition of the water contained in such formations and the factors affecting its characteristics. Chemical analyses of representative water samples from the different formations were carried out. Cations of Ca++, Mg++, K+, and Na+ as well as the anions HCO3-, SO4--, and Cl- were noted. Chemical composition of representative samples of the different rock formations was also determined. The chemistry of this water is principally affected by the nature of the rocky formations through which it percolates, particularly during the early stages of mineralization. Conditions of the geological structures, climate, and paleogeography are among other factors affecting the chemical characteristics of the water in this area. (Black-Arizona)
W73-07146

2L. Estuaries

COMPARATIVE STUDY OF THE BENTHIC MICROBIAL BIOTA IN SOME COASTAL AREAS OF PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 05C.
W73-06517

SEAL BEACH NATIONAL WILDLIFE REFUGE.
For primary bibliographic entry see Field 06E.
W73-06533

SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE.
For primary bibliographic entry see Field 06E.
W73-06534

MAINE LAW AFFECTING MARINE RESOURCES, VOL 5, INDEX TO A STUDY CARRIED OUT UNDER THE JOINT SPONSORSHIP OF: THE SCHOOL OF LAW OF THE UNIVERSITY OF MAINE AND THE NATIONAL SCIENCE FOUNDATION OFFICE OF THE SEA GRANT PROGRAMS.
Maine Univ., Portland. School of Law.
For primary bibliographic entry see Field 06E.
W73-06560

A BILL TO AUTHORIZE THE ACQUISITION OF THE BIG CYPRESS NATIONAL FRESH WATER RESERVE IN THE STATE OF FLORIDA, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W73-06573

PUBLIC RIGHTS AND COASTAL ZONE MANAGEMENT,
North Carolina Univ., Chapel Hill. School at Law.
For primary bibliographic entry see Field 06E.
W73-06579

WETLANDS ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06596

FOURTEEN SELECTED MARINE RESOURCE PROBLEMS OF LONG ISLAND, NEW YORK: DESCRIPTIVE EVALUATIONS,
Travelers Research Corp., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06597

THE DESIGN OF A MANAGEMENT INFORMATION SYSTEM FOR COASTAL RESOURCES PLANNING,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06598

COAST STABILIZATION AND PROTECTION ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06600

PROBLEM OF THE HYGIENIC INVESTIGATION AND SANITARY PROTECTION OF COASTAL WATERS (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 05G.
W73-06604

DISTRIBUTION OF PELAGIC TUNICATES IN THE WESTERN PART OF THE BAY OF BENGAL,
Andhra Univ., Waltair (India). Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-06676

UPPER LETHAL TEMPERATURES OF THE PELECYPOD MODIOLUS DEMISSUS IN RELATION TO DECLINING ENVIRONMENTAL TEMPERATURES,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-06697

SALINE AND OFFSHORE GROUND WATER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 02F.
W73-06723

GENERALIZING WATER TABLE DATA,
North Carolina State Univ., Raleigh. Dept. of Statistics.
For primary bibliographic entry see Field 02F.
W73-06732

TIDAL CIRCULATION AND SEWAGE POLLUTION IN A TROPICAL MARINE LAGOON,
Trust Territory of the Pacific Islands, Koror, Caroline Islands. Entomology Lab.
For primary bibliographic entry see Field 05B.
W73-06795

'INFLATABLE' DAMS CONTROL CHLORIDE INTRUSION,
For primary bibliographic entry see Field 05G.
W73-06798

MIXING MODEL PREDICTION OF FLUORIDE DISTRIBUTION IN CHESAPEAKE BAY,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-06813

PREDICTION OF SHALLOW-WATER SPECTRA,
Tetra Tech, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 08B.
W73-06814

VARIATIONS IN MORPHOLOGY OF MAJOR RIVER DELTAS AS FUNCTIONS OF OCEAN WAVE AND RIVER DISCHARGE REGIMES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
L. D. Wright, and J. M. Coleman.
American Association of Petroleum Geologists Bulletin, Vol 57, No 2, p 370-398, February 1973. 18 fig, 4 tab, 29 ref.

Descriptors: *Deltas, *Geomorphology, *Surf, *Sedimentation, Sediment transport, Erosion, Beach erosion, Beaches, Waves (Water), Coasts, Sediment load, Sediment yield, Sedimentation rates, Sediment discharge, Sediment distribution.

The relative contributions of riverine and marine forces to the construction of river deltas were studied in seven deltas, the Mississippi, Danube, Ebro, Niger, Nile, Sao Francisco, and Senegal. A spectrum of delta types reflecting process regimes ranges from fluvial-dominated, low-wave-energy (Mississippi) to wave-dominated, low-fluvial-influence (Senegal). Deltas at the river-dominated end of the spectrum are characterized by highly irregular and protruding shorelines, a sparsity of wave-built features, and low lateral continuity of sands. Wave-dominated deltas exhibit straight shorelines characterized by well-developed barriers and beach ridges with high lateral continuity of sands. River-dominated shoreline configurations result only when the river is able to build flat offshore profiles; where the subaqueous slope is steep, wave-built shoreline landforms dominate the delta. (Knapp-USGS)
W73-06836

REGIONAL SHELF STUDIES--A GUIDE TO ENGINEERING DESIGN,
Army Coastal Engineering Research Center, Washington, D.C.
S. J. Williams, and D. B. Duane.

Reprint 3-72, September 1972. 10 p, 3 fig, 11 ref. (Reprinted from Marine Technology Society 8th Annual Conference Proceedings, p 227-236.).

Descriptors: *Sedimentology, *Coasts, *Sedimentation, *Sediment distribution, *Atlantic Ocean, United States, New England, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, Florida, Sands, Shore protection, Sampling, Basic data collections, Sediment transport, Coastal engineering.
Identifiers: *Atlantic inner continental shelf, Shoreline nourishment.

The Inner Continental Shelf Sediment and Structure Program (ICONS) provides data for a comprehensive regional study of the geology, sedimentary processes and foundation engineering character of the U. S. shore and inner continental shelf. Main emphasis is directed toward locating and delineating sand resources potentially available for shoreline nourishment and toward geologic interpretation of the shelf history during the last 25,000 years. Basic data are derived by utilization of high resolution, medium penetration, seismic reflection profiling and pneumatic vibratory coring devices. To date, 8400 miles of seismic profiles and 1200 sediment cores (about 30 feet long) have been obtained from the Atlantic shelf off New England, Long Island, New Jersey, Delaware, Maryland, Virginia, North Carolina and eastern Florida. Data coverage is confined to water depths of 30-150 feet, within approximately 15 miles of shore. (Woodard-USGS)
W73-06839

TRACE METAL ENRICHMENT IN THE SEA--SURFACE MICROLAYER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 05A.
W73-06873

MERCURY: SHORT-TERM STORAGE OF NATURAL WATERS,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-06874

MARSH BUILDING WITH DREDGE SPOIL IN NORTH CAROLINA,
For primary bibliographic entry see Field 04A.
W73-06953

MASS TRANSPORT IN FLOWING GROUNDWATER,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02F.
W73-06970

ROTATING FLUID STUDIES WITH RELEVANCE TO GEOPHYSICS,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 02E.
W73-07033

PORT ROYAL SOUND ENVIRONMENTAL STUDY.
South Carolina Water Resources Commission, Columbia.
For primary bibliographic entry see Field 05B.
W73-07057

MATHEMATICAL SIMULATION OF THE FLOW DYNAMICS AND CONSTITUENT TRANSPORT IN PORT ROYAL SOUND, SOUTH CAROLINA: AN INTERIM REPORT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-07058

POTENTIAL FOR GROUNDWATER DEVELOPMENT,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 05B.
W73-07060

THE DISTRIBUTION OF DISSOLVED ORGANIC MATTER IN THE NEAR-SHORE WATERS OF THE TEXAS COAST,
Texas Univ., Port Aransas. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W73-07066

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

STUDIES OF THE EFFECT OF DESALINATED DRINKING WATER ON THE FUNCTIONAL STATE OF THE ORGANISM,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-06769

SANITARY EVALUATION OF WATER DESALINATED BY THE EDUM-300-2 ELECTRODIALYZER,
Meditsinskii Institut, Tselinograd (USSR).
For primary bibliographic entry see Field 05F.
W73-06771

PROCESS FOR THE REMOVAL AND RECOVERY OF MINERAL POLLUTANTS FROM WATER,
Aerojet-General Corp., El Monte, Calif. (assignee).
D. O. De Pree.
U.S. Patent No. 3,700,592, 7 p, 16 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1374, October 24, 1972.

Descriptors: *Patents, *Minerals, *Demineralization, *Desalination, *Metals, *Ion exchange, Cation exchange, Anion exchange, Treatment, *Pollutants, Water quality control, Water pollution control, Separation techniques, *Waste water treatment.

Water with ionic pollutants is passed through a bed of mixed ion exchange material. Spent cationic regenerant water is treated with a metal precipitant to form precipitated metal carbonates and the cationic regenerant stream is recovered to be recycled. Spend anionic regenerant water is contacted with the precipitated metal carbonate at elevated temperature to precipitate metal salts and recover the metal precipitant for recycling. Fourteen examples of experimental tests are cited. (Sinha-OEIS)
W73-07008

CLEANING OF USED MEMBRANE WITH OXALIC ACID,
Secretary of the Interior, Washington, D.C. (assignee).
W. S. Higley.
U.S. Patent No. 3,700,591, 4 p, 3 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1374, October 24, 1972.

Descriptors: *Patents, *Membranes, *Reverse osmosis, *Desalination, Brackish water, Sea water, Saline water, Water treatment, Water quality control, *Acids.
Identifiers: *Oxalic acid, *Chemical treatment.

This method of cleaning and rejuvenating a membrane used in reverse osmosis desalination processes takes advantage of the chemical nature of the deposit left on the membrane. The membrane can be cleaned in-situ. It is contacted with a dilute aqueous solution of oxalic acid preferably near room temperature. The membrane properties may be improved by following with treatment by a swelling agent or use of a hot water solution. Five examples are cited. (Sinha-OEIS)
W73-07009

A PLANNING MODEL TO PROJECT THE POTENTIAL FOR DESALTING IN THE UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
T. W. Rothermel.
Available from Superintendent of Documents, U.S. Gov't Printing Office, Wash, DC Price: $1.25. Office of Saline Water Research and Development Progress Report No 784, August 1972. 131 p, 20 fig, 22 tab. OSW Contract 14-30-2613.

Descriptors: *Desalination, *Forecasting, *Planning, Mathematical models, Water allocation, *Water demand, Water supply, Model studies, United States, Cost analysis.
Identifiers: *Demand/supply balance.

The purpose was to develop a dynamic simulation model which would translate the relevant factors of water supply and demand into a forecast of desalting potential. The magnitude of the projected role of desalting will influence the plans of federal, state, and local water resource agencies as well as the research and development programs of desalting manufacturers. The computerized model projects the needs for desalting in 20 major hydrologic regions in the United States on the basis of a comparison of projected demand to available supply in 100 subregions. A novel ingredient of this demand/supply balance is the consideration of the impact of pollution upon the total water requirements of a region. (OSW)
W73-07018

FEASIBILITY OF DESALTING MUNICIPAL WATER SUPPLIES IN MONTANA,
Control Systems Research, Inc., Arlington, Va.; and Montana Water Resources Board, Helena.
I. C. Watson, F. M. Heider, J. Acord, and E. F. Miller.
Available from the Superintendent of Documents US Gov't Printing Office, Washington, D.C. Price: $2.50. Office of Saline Water Research and Development Progress Report No 783, October 1972. 336 p, 86 fig, 126 tab, 62 ref. OSW Contract 14-01-0001-2727.

Descriptors: *Montana, *Water quality, Treatment, *Desalination, Feasibility studies, *Cost analysis, *Benefits, *Cost-benefit analysis.

This is a preliminary engineering and economic assessment of the costs and benefits of applying various desalting techniques to improve the quality of community water supplies in the plains region of Eastern Montana. Ten Montana communities were selected by the Montana Water Resources Board as the candidates for assessment. These communities are: Circle, Fairview, Froid, Fromberg, Malta, Medicine Lake, Melstone, Nashua, Roundup and Wolf Point. Benefits were estimated to exceed desalting costs for six of these ten study communities. Cost of water improved in quality from brackish to USPHS standards ranged from a low of 66 cents per 1000 gallons for Malta to a high of $2.66 per 1000 gallons for the small community of Froid. These costs include feedwater pumping, pre-treatment desalting, brine disposal to lined ponds or injection to deep wells and fresh water distribution. (OSW)
W73-07019

THE STRUCTURE AND PROPERTIES OF WATER AND AQUEOUS SOLUTIONS,
IBM Research Lab., San Jose, Calif.
For primary bibliographic entry see Field 01B.
W73-07020

ANALYSIS AND SUMMARY REPORT OF OPERATION GUANTANAMO NAVAL BASE DESALINATION FACILITY,
Burns and Roe Inc. Oradell, N.J.
P. M. Rapier, W. H. Rowe, A. C. Ko, P. P. DeReinzo, and H. Gitterman.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402 Price $4.75. Office of Saline Water Research and Development Progress Report No. 769, June 1972. 235 p, 123 fig, 49 ref. OSW Contract 14-30-2806.

Descriptors: *Desalination plants, *Flash distillation, Dual-purpose, *Operating costs, Corrosion control, *Design data, Water treatment, *Operation and maintenance, Design criteria, Evaporators.
Identifiers: *Guantanamo desalting plant, Point Loma plant, Feedwater treatment.

The six-year operating history of the Guantanamo Naval Base 2.25 MGD desalting and power generation facility has been reviewed, analyzed and categorized in terms of plant performance, component reliability and lifetimes for use as guidelines in the design, operation and maintenance of commercial desalting facilities. Since their installation the three 0.75 MGD plants have operated on a reliable commercial basis at rated capacity and performance at costs compatible with the design criteria; at 92.7% on-stream time the three units averaged 2.0 MGD and 6.8 performance ratio, using 195 deg F top-temperature brine and Hagevap pretreatment with periodic acid cleaning; evaporator vessels were satisfactory except for some failures of waterboxes, mitered elbows and product water trays; evaporator outages due to pump failures were minimal because of redundancy, and only small losses of performance and production resulted; tube failures were limited to 16.95% of the heat rejection tubes, which were due primarily to blockage by foreign objects. (OSW)
W73-07021

3B. Water Yield Improvement

THE WATER RESOURCES OF THE RIO GRANDE DE TARCOLES BASIN, COSTA RICA,
World Meteorological Organization, San Jose (Costa Rica). Central American Hydrometeorological Project.
J. R. Jovel, and L. E. Ahlgren.
Hydrological Sciences Bulletin (IAHS), Vol 17, No 4, p 405-418, December 1972. 6 fig, 3 tab, 8 ref.

Descriptors: *Water resources, *Streamflow, *Groundwater resources, *Water utilization, Water resources development, Water supply, Surveys, Water yield.
Identifiers: *Costa Rica, *Rio Grande de Tarcoles (Costa Rica).

Hydrological Studies were carried out in the Rio Grande de Tarcoles basin, Costa Rica, in order to determine the development potential of its water resources, and the quantity of water available to supply domestic, industrial, agricultural, navigation and hydropower generation needs of the study area. In addition, estimates were made of the present (1970) uses of water, and comparisons were made with the existing resources to determine the degree of utilization of the available water. Of the total precipitation in the study area, 23% runs out to the ocean as direct or storm runoff, 41% is the groundwater contribution to river flow, and 36% is consumed through evapotranspiration. Annual river discharge during normal and dry years amounts to 101 and 65 cumecs, respectively. Minimum monthly baseflow is 35 cumecs, and the safe yield of the groundwater reservoir might be about 29 cumecs. The present gross use of water is 58.3 cumecs; the net use amounts to 6.7 cumecs, and 3.0 cumecs were consumptively used in the basin. The main gross use sector is hydropower generation, navgation, irrigation, and domestic and industrial water supply follow in order of decreasing magnitude. The amount of present gross water use is high since nearly 60% of the average river flow and about 90% of the dry-weather flow are utilized. Net consumption is low since only about 3% of the normal resources is irrecoverably lost. (Knapp-USGS)
W73-06829

WATER-RESOURCES RECONNAISSANCE OF ANAKTUVUK PASS, ALASKA,
Geological Survey, Anchorage, Alaska.
C. E. Sloan.
Geological Survey open-file report, June 1972. 12 p, 2 fig, 1 tab, 3 ref.

Descriptors: *Water resources, *Water supply, *Surface waters, *Available water, *Groundwater resources, *Alaska, Snowmelt, Lakes, Streams, Water supply development, Water quality, Chemical analysis, Surveys, Planning, Water wells, Hydrologic data.
Identifiers: *Anaktuvuk Pass (Alaska).

A hydrologic reconnaissance was made of Anaktuvuk Pass, Alaska, in the central Brooks Range during the summer of 1971 to help develop a water supply for the village school. Winter icings and summer flow conditions in Contact Creek both indicate that groundwater is present beneath the creek bed. A well-site area was selected in the channel of Contact Creek near the school. Drilling should be undertaken in springtime prior to breakup when water levels in the gravels are lowest. Most of the water used at Anaktuvuk Pass during the summer comes from surface water in Contact Creek and during the winter from melting snow. When these sources are unavailable, water is carried from springs near the south end of the airstrip or from Eleanor Lake. Chemical analyses of water from Eleanor Lake and Contact Creek made in 1961 indicate that the inorganic chemical quality of water is very good. However, all surface-water sources at Anaktuvuk Pass are moderately to highly contaminated by bacteria. (Woodard-USGS)
W73-07041

SOME COUNTERACTIVE EFFECTS OF ANTITRANSPIRANTS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 02D.
W73-07139

TECHNOLOGY ASSESSMENT OF WINTER OROGRAPHIC SNOWPACK AUGMENTATION IN THE UPPER COLORADO RIVER BASIN--THE IMPACTS OF SNOW ENHANCEMENT: VOLUME I. SUMMARY REPORT,
Stanford Research Inst., Menlo Park, Calif.
L. W. Weisbecker.
Final Contract Report, May 1972 (Vol 1 of 2 Vol). 38 p, 1 fig, 2 tab. Contract NSF-C641.

Descriptors: *Snow surveys, *Snowpacks, *Snowmelt, *Water equivalent, *Colorado River Basin, Cloud physics, Weather modification, Technology, Precipitation (Atmospheric), Costs, Runoff, Avalanches, Meteorology, Water yield, Flood forecasting, Water quality, Chemical analysis, Streamflow, Recreation facilities, Water balance, Hydrologic budget, Reviews.
Identifiers: *Orographic snowpack augmentation, Technology assessment.

In January 1971, a technology assessment of winter orographic snowpack augmentation (WOSA) in the Upper Colorado River Basin was initiated. This report (Volume 1 of two volumes) summarizes the study. Specific findings relate to existing laws, institutions, and public policy; augmenting the Colorado River by WOSA; environmental impacts and economic impacts; social attitudes and public policy strategies; and liability considerations. Conclusions and recommendations are presented in regard to an operational WOSA program for the Colorado River Basin; a Federal Weather Modification Regulatory Board; and technology assessment of WOSA in the Upper Colorado River Basin. (See also W73-07150) (Woodward-USGS)
W73-07149

TECHNOLOGY ASSESSMENT OF WINTER OROGRAPHIC SNOWPACK AUGMENTATION IN THE UPPER COLORADO RIVER BASIN--THE IMPACTS OF SNOW ENHANCEMENT: VOLUME II: TECHNICAL REPORT,
Stanford Research Inst., Menlo Park, Calif.
L. W. Weisbecker.
Final Contract Report, May 1972 (Vol 2 of 2 vol). 613 p, 33 fig, 99 tab, 294 ref. Contract NSF-C641.

Descriptors: *Snow surveys, *Snowpacks, *Snowmelt, *Water equivalent, *Colorado River basin, Cloud physics, Weather modification, Technology, Precipitation (Atmospheric), Costs, Runoff, Avalanches, Meteorology, Water yield, Flood forecasting, Water quality, Chemical analysis, Streamflow, Recreation facilities, Water balance, Hydrologic budget, Reviews.
Identifiers: *Orographic snowpack augmentation, Technology assessment.

A technology assessment was conducted of winter orographic snowpack augmentation (WOSA) in the Upper Colorado River basin. This report (Volume 2 of two volumes) describes the technology assessment which consists of a cost/effectiveness analysis of WOSA based on the current state of the art in snowpack augmentation; estimate of the improvement in costs and benefits that might be achieved within the next five years through improvements in the state of the art of snowpack augmentation; assessment of the impact of snowpack augmentation on the economic, social, and environmental systems in the area of need or use (beneficiary area), the area of origin (target area), and peripheral areas; assessment of public attitudes toward snowpack augmentation and how they might be improved; assessment of the legal and jurisdictional consequences of snowpack augmentation and of potential public policies regarding its implementation; and comparison of snowpack augmentation with other alternative means of alleviating water problems in the area of need. (See also W73-07149). (Woodard-USGS)
W73-07150

3C. Use of Water of Impaired Quality

N. G. MINASHINZ.
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
For primary bibliographic entry see Field 02G.
W73-06983

OLD AND NEW PROBLEMS IN THE RECLAMATION OF SOILS IN THE IRRIGATION ZONE (STARYYE I NOVYYE PROBLEMY POCHVENNYKH MELIORATSIY V ZONE OROSHENIYA),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 03F.
W73-06985

NOTE OF THE GROWTH OF RHIZOBIUM STRAINS OF DHAINCHA (SESBANIA CANNABINA (RETZ.) PERS.) IN A SALINE-ALKALI SOIL,
Central Soil Salinity Research Inst., Karnal (India).
K. K. R. Bhardwaj.
Indian Journal of Agricultural Sciences, Vol 42, No 5, p 432-433, May 1972. 1 tab, 5 ref.

Descriptors: *Nitrogen fixing bacteria, *Symbiosis, *Reclamation, *Physiological ecology, *Soil bacteria, Rhizosphere, Saline soils, Alkaline soils, Salinity, Salt tolerance, Seed treatment, Adaptation, Soil investigations, Soil amendments, Plant growth, Agronomy, Legumes, Agriculture, Resistance.
Identifiers: India.

Dhaincha is an effective salt tolerant leguminous crop grown for reclaiming saline and alkali soils. Inoculation of its seeds with efficient and appropriate Rhizobium strains helps in its establishment and nitrogen nutrition. Rhizobia screened from these soils may prove to be better inoculant strains because of their capacity to tolerate saline and sodic conditions of the soils. To gain information about these aspects, the survival and proliferation of 4 efficient strains of Rhizobium of dhaincha isolated from 3 different soils were studied in a saline-alkali soil. Two strains were selected from a saline-alkali soil after testing the symbiotic efficiency of 20 isolates of Rhizobium species of dhaincha. Two other efficient strains were isolated from the dhaincha plants grown in 2 different normal soils. Normal sterilized soil samples (200 g each) and those amended with gypsum or farmyard manure (1 percent each) were inoculated with the strains. Results indicate that the inoculant strains should be isolated from the problem soils in the interest of the establishment and proper multiplication of bacteria in the soil. Further, certain amendments such as the application of gypsum and farmyard manure may stand to ameliorate the adverse conditions to some extent for ecologically different rhizobia. (Black-Arizona)
W73-07125

NOTE ON LITHIUM IN SALINE GROUND WATERS,
Central Soil Salinity Research Inst., Karnal (India).
I. C. Gupta.
Indian Journal of Agricultural Sciences, Vol 42, No 7, p 650-651, July 1972. 1 tab, 3 ref.

Descriptors: *Trace elements, *Toxicity, *Resistance, *Water quality, Water pollution effects, *Water chemistry, Saline water, Salinity, Groundwater, Irrigated land, Toxins, Plant growth, Fruit crops, Sampling, Photometry, Resins, Cation exchange, Separation techniques, Electrical conductance.
Identifiers: *India, *Lithium.

Lithium is an important trace element which may be generally found in most saline ground waters and irrigated soils was studied. Small concentrations of lithium in irrigation water produce toxic effects on the growth of the citrus crops, and tolerance of various plants to lithium parallels that of sodium. The occurrence of lithium in saline ground waters of India was studied. Thirty-five ground water samples from the Mathura district of Uttar Pradesh were taken and analyzed for lithium by flame-photometer, according to the method of Bradford and Pratt, using a column of Dowex 50W-X8 strongly acid cation-exchange resin for separation. Results show that ground waters of higher salinity contain higher concentrations of lithium. Waters with electrical conductivity of 4,000 umhos per cm at 25 C or less are less susceptible to toxic concentrations of lithium, and waters of electrical conductivity of 6,000 umhos per cm or more may contain lithium in amounts that may be toxic to crops. When assessing the quality of irrigation waters, lithium should also be determined in addition to electrical conductivity, principal cations and anions, and boron, particularly in medium to highly saline waters. (Black-Arizona)
W73-07126

SPRINKLING AND PONDING TECHNIQUES FOR RECLAIMING SALINE SOILS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
J. D. Oster, L. S. Willardson, and G. J. Hoffman.
Transactions of the ASAE, American Society of Agricultural Engineers, Vol 15, No 6, p 1115-1117, November-December 1972. 4 fig, 1 tab, 7 ref.

Descriptors: *Reclamation, *Saline soils, *Irrigation efficiency, Sprinkler irrigation, Ponding, Irrigation practices, Agriculture, Salinity, California, Agricultural engineering, Leaching, Southwest U.S., Application methods.

Traditionally, saline soils have been leached by continuously ponding water on the field for long periods of time. However, recent studies have shown that sprinkling and intermittent ponding are more efficient under certain conditions. An experiment was conducted at the Imperial Valley Conservation Research Center at Brawley, California, to compare continuous ponding, intermittent ponding, and sprinkling for reclaiming a saline Holtville silty-clay soil. The experimental field was divided into three plots of 1,150 square meters for comparing the three leaching techniques. Twelve salinity sensors were installed in each plot 3 months before the first water application. Soil samples for determining water content and bulk density were also taken 3 months before the first water application in addition to 3 weeks after the last application. Results confirm earlier studies and indicate that leaching by intermittent ponding or sprinkling uses less water than continuous ponding and achieves the same degree of leaching in the same period of time. (Black-Arizona)
W73-07127

ASPECTS OF DRAINAGE AND LAND RECLAMATION IN THE LOWER MESOPOTAMIAN PLAIN. A PROBLEM ANALYSIS,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 04A.
W73-07135

THE EFFECT OF USING SALINE WATER FOR IRRIGATION ON THE GROWTH AND CHEMICAL PROPERTIES OF ROSELLE PLANTS (HIBISCUS SABDARIFFA L.),
National Research Centre, Cairo (Egypt).
M. T. El-Saidi, and M. Hawash.
Z Acker Pflanzenbau. Vol 134, No 3, p 251-256, 1971.
Identifiers: *Irrigation effects, *Saline water, Chemical properties, Flowering, Plant growth, Hibiscus sabdariffa D, Irrigation, Plants, Roselle, Time.

The effect of using saline water for irrigation on the growth, P content, N content and the yield of roselle plants was studied. Using saline water for irrigation in general caused an increase in the total N and total P in the stem and leaves but on the other hand, the total carbohydrate content decreased. Salinity caused a decrease in plant height, dry weight of roots, stem and leaves, and this was related to the level of salts in irrigating water. Salinity delayed the flowering date about 1 wk. The oil content in the seeds and the yield of calyx, the fiber in the stem were decreased by saline water.--Copyright 1972, Biological Abstracts, Inc.
W73-07136

SALINITY TOLERANCE WITHIN THE GRASS SPECIES AGROSTIC STOLONIFERA L.,
Reading Univ. (England). Dept. of Agricultural Botany.
B. L. Tiku, and R. W. Snaydon.
Plant and Soil, Vol 35, p 421-431. 1971. 1 fig, 6 tab, 27 ref.

Descriptors: *Grasses, *Salt tolerance, *Range management, *Plant growth, *Halophytes, *Soil-water-plant relationships, Plant physiology, Laboratory tests, Bioassay, Sodium chloride, Root development, Soil environment, Plant growth substances, Metalbolism, Resistance, Saline soils.

Agrostis stolonifera, an outbreeding perennial grass species, is morphologically variable, and is widely distributed in Europe and the British Isles. It occurs on a wide variety of soils and is tolerant of a wide range of soil pH, P and K. Eight populations of Agrostis stolonifera, collected from maritime and inland habitats, were grown in solution culture and in sand culture at various concentrations of sodium chloride from 0 ppm to 5,000 ppm Na. NaCl had less effect upon the dry weight yield of populations from maritime habitats, with soils of high Na content, than upon populations from inland or maritime habitats with low Na content. Populations from inland or maritime habitats, with soils of low Na content, contained more Na in their shoot materials, and higher Na/K ratios, than did populations from high Na soils, at all Na concentrations. The effect of NaCl upon the root elongation of each population was not correlated with the effect upon dry weight yield, nor with the Na content of their native soil. The effect of NaCl upon root elongation was highly dependent upon the composition of the culture solution used. It is concluded that the effect of NaCl on root elongation is not an adequate measure of salinity tolerance in this species. Data from this investigation can be used as extrapolation material for studies in arid and semiarid environments. (Black-Arizona)
W73-07148

3D. Conservation in Domestic and Municipal Use

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS VOLUME V: A METHOD OF DATA REDUCTION FOR WATER RESOURCES INFORMATION STORAGE AND RETRIEVAL,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 07C.
W73-06505

TEXOMA REGION AREAWIDE WATER PLAN PHASE II.
Freese, Nichols and Endress, Fort Worth, Tex.
For primary bibliographic entry see Field 06B.
W73-06607

COMPREHENSIVE WATER AND SEWERAGE PLAN FOR DUKES COUNTY (MASSACHUSETTS).
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 05D.
W73-06618

WATER AND SEWER PLAN.
Erie County Metropolitan Planning Commission, Pa.
For primary bibliographic entry see Field 05D.
W73-06619

THE CHRISTINA PROJECT: ENVIRONMENTAL PROTECTION IN URBAN GROWTH AREAS,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 06G.
W73-06864

PRELIMINARY WATER PLAN FOR THE BALTIMORE SECTION,
Regional Planning Council, Baltimore, Md.
A. G. Leary.
June 1968. 83 p, 7 fig, 6 tab, 23 ref. HUD MD - P - 61.

Descriptors: *Water supply, *Regional planning, Long-term planning, Water treatment, Facilities, Capital, Distribution systems, *Maryland.
Identifiers: *Baltimore, Water distribution facilities, Capital spending programs.

A preliminary long-range water supply plan is presented for the Baltimore region, along with a corresponding twenty-year capital program for construction of water treatment and distribution facilities. The Plan and Program includes facilities of regional as well as local significance. The twenty-year capital program is further separated into two stages: the initial five-year program and the subsequent fifteen-year program. (Davis-Chicago)
W73-06895

UPPER TRINITY RIVER BASIN COMPREHENSIVE SEWERAGE PLAN.
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 05D.
W73-06896

WATER QUALITY MANAGEMENT PLAN FOR THE KANSAS CITY METROPOLITAN REGION, PHASE I.
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05G.
W73-06901

PLANNING TO SAVE NATURAL RESOURCES IN RESIDENTIAL DEVELOPMENT,
New York State Capital District Region. Cooperative Extension Service, Oneida County.
For primary bibliographic entry see Field 06B.
W73-06909

REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE.
Cahn, Inc., New Haven, Conn.
For primary bibliographic entry see Field 05D.
W73-06911

COMPREHENSIVE WATER AND SEWERAGE PLANNING, GRAYSON COUNTY TEXAS.
Freese, Nichols and Endress, Fort Worth, Tex.
For primary bibliographic entry see Field 06B.
W73-06914

WATER RESOURCES INVENTORY,
Lake Porter County Regional Transportation and Planning Commission, Crown Point, Ind.
N. E. Tufford.
January 1971. 300 p, 49 fig, 49 tab, 14 maps, 33 ref. HUD Indiana P-74.

Descriptors: *Water resources, *Data collections, *Data storage and retrieval, Basin data-collections, Maps, Statistics, Computers, Information retrieval, Planning, Indiana.
Identifiers: *Lake County (Ind), *Porter County (Ind), *Water resource inventory, Computer storage systems, Planning tool.

All of the water resource information which is pertinent to the Lake and Porter Counties Indiana area has been collected in a library file. From the information that has been collected, summaries have been prepared and gathered together for quick reference. A bibliography is provided for referral for those needing more data or an examination of the original document. These summaries include important quotations, document outlines, tabular summaries of pertinent data. Also included are maps which illustrate the various spatial parameters of the water resource system. Material was assembled in a manner suitable for future storage within a computer storage system. (Davis-Chicago)
W73-06916

COMPREHENSIVE SANITARY SEWERAGE AND STORM DRAINAGE FACILITIES PLAN FOR THE INCORPORATED COMMUNITIES, PREPARED FOR LIMA - ALLEN COUNTY REGIONAL PLANNING COMMISSION.
Browne (Floyd G.) and Associates Ltd., Marion, Ohio.
For primary bibliographic entry see Field 05G.
W73-06917

PHASE II: REGIONAL WATER, SEWERAGE, AND DRAINAGE PROGRAM, INITIAL PLAN.
Metcalf and Eddy, Inc., Palo Alto, Calif.

Report prepared for the Association of Bay Area Governments, Berkeley, Calif., September 1971. 217 p, 6 fig, 24 tab, 2 maps, 4 ref.

Descriptors: *Management, *Water supply, *Waste water treatment, *Drainage, Water resources, City planning, Facilities, Flood control, Drainage systems, *California.
Identifiers: *Regional planning, *San Francisco Bay Area, Metropolitan water resources management.

This study develops planning objectives and guidelines for each of the water resource components (water supply, waste water treatment, and drainage) and recommends implementation programs as required to achieve regional management of this resource. The problems encountered in dealing with the total water resource of an area on a regional basis are complex because: (1) water resource management is but one aspect of regional urban planning; (2) traditionally, water management has been handled on a local or localized subregional basis; and (3) the components that make up the water resource of an area are interrelated and must be considered in relation to each other. In the past years a great deal of water resource planning and construction has taken place throughout the nine-county San Francisco Bay Area. Potable water has been transported many miles to provide man's needs in the region, many water and waste water management facilities have been constructed, and numerous flood control and drainage structures have been built. Much remains to be done, particularly in the field of waste water treatment. (Davis-Chicago)
W73-06918

MANAGING THE NATURAL ENVIRONMENT, A REGIONAL PLAN FOR WATER, SEWAGE, AIR, AND REFUSE,
Tri-State Transportation Commission, New York.
R. DeTurk, and R. Wood.
March 1970. 38 p, 11 fig, 16 tab, 9 ref.

Descriptors: *Management, *Water supply, *Water pollution, *Air pollution, *Solid wastes, *Water supply development, Sewage treatment, Financing, Regional development, State governments, Monitoring, Water pollution control, Environmental control.
Identifiers: *Regional planning, *New York metropolitan area, Enforcement, Pollution detection.

Pollution of air and water, the search for enlarged water supplies and the accelerating problems of solid-waste disposal in the New York metropolitan area are discussed. The status and needs of regional housekeeping both now and in the future are described. Recommendations are: (1) the states accept responsibility for assuring water supplies consistent with present and future needs, such a program should be self-supporting; (2) existing plans for enlarged and improved sewage treatment should be accelerated, and federal assistance should be utilized; (3) state leadership should establish a regional pattern of solid waste disposal; and (4) a regional monitoring system should evaluate air and water pollutants, and a uniform detection and enforcement system should be established for all of the Region's points of discharge. (Davis-Chicago)
W73-06920

PRELIMINARY DETAILED PLANS FOR SPOKANE RIVERFRONT DEVELOPMENT.
Spokane County Planning Commission, Wash.
For primary bibliographic entry see Field 06F.
W73-06922

FLOOD LOSSES - WILL THEY EVER STOP.,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 06E.
W73-06928

3E. Conservation in Industry

FOSSIL FUEL SUPPLIES AND FUTURE ENERGY NEEDS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 06D.
W73-06683

CONCERNING THE WATER SUPPLY FOR CHEREPOVETS,
Regional Sanitary-Epidemiological Center, Vologda (USSR).
For primary bibliographic entry see Field 05F.
W73-06772

PROJECTS IN INDUSTRIAL POLLUTION CONTROL PROGRAM, JULY 1972,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 05G.
W73-07064

POWER PLANT HEAT REJECTION IN AN ARID CLIMATE,
Arizona Univ., Tucson. Engineering Experiment Station.
F. C. Scofield, III.
University of Arizona Press, EES Series Report 33, 1971. 86 p, 23 fig, 7 tab, 33 ref.

Descriptors: *Powerplants, *Heat transfer, *Heat budget, *Consumptive use, Decision making, *Evaporation, *Mathematical models, *Reservoir evaporation, Arid lands, Southwest U.S., Steam, Engineering, Water shortage, Economics, Cooling towers, Evaporation control, Cooling, Sites, *Arizona, Heat balance, Reservoir sites, Thermal pollution.

Installation of steam power plants to satisfy the rising demand for electricity will require increasingly large quantities of water to dissipate the heat rejected by evaporative condenser cooling systems. In regions where water is in short supply, such as the southwest U.S., consumptive use of water by a steam power plant may place a constraint on the plant size and location, and may affect the choice of nuclear or fossil fuel. Lack of a firm water supply for cooling tower makeup may necessitate a reservoir, which could then be used

as a cooling pond. The objectives were to investigate the factors influencing evaporation from a cooling tower, cooling pond, and a cooling pond with a supplemental spray system, and to estimate the monthly annual evaporation for each alternative. Appropriate mathematical models of cooling towers, ponds, and spray systems were developed based on meteorological phenomena. Evaporation from cooling towers and spray systems was calculated using the heat and mass balance method. Monthly evaporation, using Arizona climatological data, was computed for various design criteria and operating conditions. Use of a spray system to provide supplemental cooling during summer months to reduce the required pond area was investigated. Results indicate that the total evaporation will be highest for a cooling pond, but the use of a supplemental spray system reduces the annual evaporation by approximately 20 per cent from that of a cooling pond designed for summer conditions. Factors affecting the ability of a cooling pond to dissipate an imposed heat load were investigated and a review of the factors affecting the ability of a cooling power plant siting in Arizona was also conducted. (Black-Arizona)
W73-07140

3F. Conservation in Agriculture

UNDERSTANDING AND IMPROVING THE SOIL-PLANT ENVIRONMENT FOR MORE EFFICIENT UTILIZATION OF WATER,
South Dakota State Univ., Brookings. Water Resources Research Inst.
M. L. Horton, C. G. Carlson, and L. R. Stone.
Available from the National Technical Information Service as PB-217 875, $3.00 in paper copy, $0.95 in microfiche. Plant Science Progress Report No. 595, February 1973. 46 p, 17 fig, 2 tab, 31 ref. OWRR A-018-SDAK (2). 14-01-0001-1862.

Descriptors: *Soil water movement, *Evapotranspiration, *Grain sorghum, *Tensiometers, *Canopy temperature, Hydraulic condutivity, Infiltration, Pressure, Soil-water-plant relationships, *South Dakota.
Identifiers: *Redfield (South Dakota), *Great Bend silt loam, *Infrared thermometer.

A number of field observations were made within an actively growing crop environment. The observations included soil water movement, evapotranspiration rates, plant canopy temperatures, and water use predictions based on plant and meteorological conditions. The results show that within three days follioing irrigation of a Great Bend silt loam soil water movement was upward at the 15-20 cm depth. Nineteen days following irrigation water movement was upward at the 130-150 cm depth. Evapotranspiration rates for grain sorghum determined by tensionmetric methods during a 31-day study period averaged 0.35 cm per day. During the 31-day study, approximately 65% of the total water loss from the soil profile was due to evapotranspiration and approximately 35% was due to flux below the root zone. Grain sorghum canopy temperatures were observed to reflect soil water conditions and changes in meteorological conditions. Irrigated sorghum canopy temperatures were usually 1-2 deg C cooler than nonirrigated sorghum canopy temperatures with maximum differences up to 5 deg C observed. Canopy temperatures changed almost immediately in response to a change in meteorological conditions. Future water management systems may utilize satellite imagery for timely observation of soils, crops, and water resources. Improvement in efficiency with which water is utilized will depend upon an understanding of how water moves and of the manner in which plants respond to changes in their environment. (Wiersma-South Dakota)
W73-06518

PARAMETER SELECTION IN TELEMETRY SYSTEMS FOR IRRIGATION,
South Dakota State Univ., Brookings. Water Resources Inst.
For primary bibliographic entry see Field 07C.
W73-06519

GREENBELT IRRIGATION - PHASE 2,
California Univ., Riverside. Dept. of Plant Sciences.
For primary bibliographic entry see Field 05D.
W73-06525

ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF GREENBELT IRRIGATION, (PHASE 3),
California Univ., Riverside. Dept. of Plant Sciences.
For primary bibliographic entry see Field 05D.
W73-06526

AUTHORIZING CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE O'NEILL UNIT, PICK-SLOAN MISSOURI BASIN PROGRAM.
For primary bibliographic entry see Field 06E.
W73-06562

A BILL TO AMEND THE ACT OF JULY 4, 1955, AS AMENDED, RELATING TO THE CONSTRUCTION OF IRRIGATION DISTRIBUTION SYSTEMS.
For primary bibliographic entry see Field 06E.
W73-06572

PLANNING NATURAL RESOURCE DEVELOPMENT, AN INTRODUCTORY GUIDE,
Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 06B.
W73-06610

REMOVAL OF MINERALS FROM SOILS OF THE DRY-STEPPE SERIES DURING IRRIGATION AND RECLAMATION. (IN RUSSIAN)
Akademiya Nauk SSR, Moscow. Pochvennyi Institut.
K. P. Pak, and I. G. Tsyurupa.
Agrokhimiya. 1. p 70-76. 1971.
Identifiers: *Soil treatment, *Irrigation effects, Minerals, Rice M, Soils.

The effects of water on soils under aerobic conditions are limited by the dissolving of salts of bicarbonates, chlorides and sulfates. Destruction of minerals and secondary formations of the coagel, metal hydroxides, etc., apparently occurs only under anaerobic conditions, with the development of restorative processes. This was observed, for example, in the soils of rice fields. Under aerobic conditions the action of 5% H_2SO_4, when there is a comparatively brief contact with the soil, differs sharply from the action of water. The acid vigorously dissolves some secondary soil formations and can cause pronounced shifts in the physical-chemical conditions and properties of the soil. However, primary aluminosilicates are weakly dissolved by 5% H_2SO_4 and its is doubtful that they would be destroyed by the application of acid. In order to avoid the creation in the soil of foci of excessive acid and the strong dissolving of secondary soil components, it is recommended that only diluted acids be added to the soil. The use of concentrated acid (especially when there is no irrigation or when application of the acid is not followed by the washing of the soil with water) can cause irreversible changes in the physical-chemical properties of the soil and very considerable destruction of the potentially mobile compounds of the soil. Copyright 1972, Biological Abstracts, Inc.
W73-06635

EFFECT OF SOIL WATER REGIME ON THE NITRATE REDUCTASE ACTIVITY OF CELLULAR STRUCTURES IN MAIZE LEAVES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Fiziologii Rastenii i Agrokhimii.
For primary bibliographic entry see Field 02G.
W73-06662

INTERACTION OF 2,3,5-TRIIODOBENZOIC ACID, TEMPERATURE, AND MOISTURE ON SOYBEAN DEVELOPMENT,
Georgia Univ., Athens. Coll. of Agricultural Experiment Stations.
K. Ohki, and L. J. McBride.
Agron J. Vol 64, No 4, p 493-497. 1972.
Identifiers: *Crop response, Benzoic acid, Glycine max D, Plant growth, Interaction, Soil moisture, *Soybeans, Temperature.

Variations in plant response to foliar application of 2,3,5-triiodobenzoic acid (TIBA) on soybean (Glycine max (L.) Merr.) under field conditions appeared to be related to temperature and soil moisture conditions near application time. Greenhouse and growth chamber studies were conducted to provide information on the interacting effects of temperature and soil moisture. A 2 x 2 x 2 factorial experiment with soybeans in the greenhouse included 2 levels of premoisture, postmoisture and TIBA. Three temperature regimes simulating cool (21/16C), warm (27/21C), and hot (32/24C) climates were additional variables to the greenhouse experiment for a 3 x 2 x 2 x 2 factorial growth chamber experiment. Effects on plant height and reproductive development were studied. The TIBA response, as determined from plant height measurements under greenhouse conditions, was reduced by soil moisture stress following TIBA application. Under growth chamber conditions the TIBA effect on plant height generally increased as temperature increased from cool to hot. Floral and/or pod abortion was enhanced under high soil moisture and high temperatures. TIBA applied at floral initiation aided in the retention of greater numbers of pods under high temperature and high soil moisture.–Copyright 1972, Biological Abstracts, Inc.
W73-06671

A METHOD OF LONG-RANGE PLANNING OF WATER SUPPLY FOR AGRICULTURE AND THE COUNTRYSIDE,
For primary bibliographic entry see Field 06D.
W73-06859

WASTEWATER MANAGEMENT BY DISPOSAL ON THE LAND.
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 05D.
W73-06862

FLOODING FOR JOHNSONGRASS CONTROL,
Agricultural Research Service, Stoneville, Miss. South Weed Science Lab.
C. G. McWhorter.
Weed Sci. Vol 20, No 3, p 238-241. 1972. Illus.
Identifiers: *Weed control, *Flooding, Sorghum halepense M, Johnsongrass.

Flooding soil with 5-10 cm of water for 7-14 days killed all freshly planted johnsongrass (Sorghum halepense (L.) Pers.) rhizomes in greenhouse and field experiments. A delay in flooding until culms emerged greatly reduced control. Flooding the soil in which 4-wk-old johnsongrass plants grew had little effect at 15 C, but plants were killed after 8 wk of flooding at 40 C. Death of buds on immersed johnsongrass rhizomes occurred more rapidly at 40 C than at 10, 20, 25, or 30 C. Flooding for 8 days at 40 C killed all rhizomes, but 16 days of flooding were required to kill all rhizomes at 30 C. Few buds were killed when flooded at 10 or 20 C, but

germination was delayed. Immersing rhizomes in water and soil provided better control than immersing them in water without soil.--Copyright 1972, Biological Abstracts, Inc.
W73-06868

PROSPECTIVE USE OF CASPIAN WATER FOR SOIL RECLAMATION (IN RUSSIAN),
For primary bibliographic entry see Field 04A.
W73-06888

STUDY ON THE WATER NECESSITY OF ONION CROP (ALLIUM CEPA, L.), (IN PORTUGUESE),
A. E. Klar, T. Kimoto, and S. Simao.
Cienc Cult (Sao Paulo), Vol 23, No 5, p 609-618, 1971, Illus, English summary.
Identifiers: Allium-Cepa-M, Crops, *Furrow irrigation, Moisture, *Onion-M, *Soil moisture, *Brazil.

Investigations were conducted in Piracicaba, Sao Paulo, Brazil, on ortho dark red latosol. The furrow irrigation method was used. Soil moisture variations were estimated by the gravimetric standard method. The best conditions for crop yield were obtained at a soil moisture content of 75%, lower tensions under 0.5 bars in the 0-20 cm soil layer. The incidence of splitting and malformed bulbs were not affected by treatments.--Copyright 1972, Biological Abstracts, Inc.
W73-06919

HYDROGEOLOGY OF FLORIDA'S LARGEST CITRUS GROVE.
Geological Survey, Tampa, Fla.
W. S. Wilson.
Proc. available from American Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017. Price $10.00. In: Age of Changing Priorities for Land and Water, Proceedings of Irrigation and Drainage Division Specialty Conference, Sept 26-28, 1972, Spokane, Wash: New York, N.Y., American Society of Civil Engineers, p 293-307, 1972. 9 fig, 2 tab, 5 ref, append.

Descriptors: *Hydrogeology, *Florida, *Water yield, *Irrigation water, Citrus fruits, Groundwater, Aquifer characteristics, Water level fluctuations, Safe yield, Artesian aquifers.
Identifiers: *De Soto County (Fla).

At a 42-square-mile citrus grove in northeastern DeSoto County, Florida, less than 10 ft of seasonal decline of the potentiometric surface will occur near the grove as a result of anticipated groundwater withdrawals for irrigation. Pumping rates may exceed 100 mgd during spring irrigation periods, but during summers the potentiometric surface will probably recover fully from the effects of pumping. Thus long-term net declines due to grove pumping will probably also be small. Irrigation wells tap the secondary and Floridan artesian limestone aquifers; well depths average 1,340 ft and yields average 1,800 gpm. Groundwater is of satisfactory quality for citrus irrigation. The hydrogeologic system at the grove fits Hantush's mathematical model for leaky-aquifer systems. Aquifer transmissivity is 270,000 sq ft per day, as determined from aquifer tests. (Knapp-USGS)
W73-06947

OLD AND NEW PROBLEMS IN THE RECLAMATION OF SOILS IN THE IRRIGATION ZONE (STARYYE I NOVYYE PROBLEMY POCHVENNYKH MELIORATSIY V ZONE OROSHENIYA),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
V. A. Kovda, and V. V. Yegorov.
Pochvovedeniye, No 4, p 3-14, April, 1972.

Descriptors: *Land reclamation, *Land management, *Irrigation, *Irrigation systems, Irrigation water, Groundwater, Drainage, Drainage systems, Impervious soils, Compacted soils, *Saline soils, Salinity, Salt balance, Leaching, Water quality, Agriculture, Crops, Planning, Methodology, Investigations.
Identifiers: *USSR, Waterlogging, Mineralization, Solonchaks.

A number of problems relating to basic land improvement for increasing agricultural production in the Soviet Union are discussed. These include: (1) soil salinity and waterlogging during irrigation; (2) impervious soils; (3) groundwater pressure; (4) sodium-carbonate salinization; and (5) quality of irrigation waters. Tasks confronting scientists in land reclamation and management studies are outlined together with the organizational and scientific aspects of planning, designing, and operating irrigation systems. (Josefson-USGS)
W73-06985

ESTIMATING TRADE-OFFS BETWEEN SEDIMENTATION AND FARM INCOME,
Illinois University, Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 04A.
W73-07025

HYDRAULIC INVESTIGATION OF CRITICAL GRADIENTS FOR APPROACHES TO FARM WATER STORAGES,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W73-07048

THE EROSION CONTROL COMPLEX IN THE ROSTOV REGION (IN RUSSIAN),
For primary bibliographic entry see Field 04D.
W73-07098

YIELD AND PERCENTAGES OF CRUDE PROTEIN AND GREEN HERBAGE IN WEEPING LOVEGRASS UTILIZED FOR DEFERRED GRAZING IN SEMIARID ARGENTINA,
Kentucky Univ., Lexington. Dept. of Agronomy.
For primary bibliographic entry see Field 04A.
W73-07113

INFLUENCE OF LEVELS OF SPRING IRRIGATION AND FERTILITY ON YIELD OF WINTER WHEAT (TRITICUM AESTIVUM L) UNDER SEMI-ARID CONDITIONS.
Pahlavi Univ., Shiraz (Iran). Dept. of Crop Science.
I. Poostchi, I. Rovhani, and K. Razmi.
Agronomy Journal, Vol 64, No 4, p 438-440, July-August 1972, 3 tab, 12 ref.

Descriptors: *Crop production, *Spring, *Irrigation, *Fertility, *Wheat, Variability, Semiarid climates, Fluctuations, Seasonal, Plant growth regulators, Nitrogen, Phosphorus, Soil moisture, Proteins, Grains (Crops), Soil-water-plant relationships.
Identifiers: Iran, Straw.

Application of nitrogen with or without phosphorus, moisture levels and season have a great effect on yield, growth characteristics and protein content of winter wheat. Variations in moisture under semiarid conditions of southern Iran can drastically change yield patterns of winter wheat (Triticum aestivum L) within the same or over several seasons. An experiment considering effects of spring irrigation and fertility levels on components of yield, plant characteristics and yield of grain and straw of 'Roushan' variety of winter wheat was conducted. The 3-year study showed that grain and straw yields were positively and significantly correlated with levels of irrigation in each crop season, and in combined 3 years, correlations for grain yield to levels of fertilizer were negative and significant. Correlation coefficients showed components of yield to be more affected by season and irrigation level than other factors, thus a fluctuation in moisture level shows a fluctuating yield pattern. (Popkin-Arizona)
W73-07114

A STUDY ON CERTAIN IRRIGATED FIELD BEAN VARIETIES GROWN FOR GRAIN AS IRRIGATED POST-STUBBLE CROPS,
Academy of Agricultural Sciences, Ruse (Bulgaria). Research Inst. of Agriculture.
P. Radkov, and M. Gramatikova.
Rastenievod Nauki. Vol 8, No 10, p 59-64. 1971. English summary.
Identifiers: *Crop production, Bean D, Crops, *Grains (Crops), Irrigation, Proteins, Rusts, Stubble.

The largest yields were obtained from the cultivars 'Dunav 2,' 'Hain Bob' and 'Dunav 1,' respectively, 1711.6, 1632.5 and 1532.8 kg/ha or 28.28, 26.78 and 19.50% over the check, 'No. 221-IZR.' The grain has a high 1000-grains weight, a high protein content and good technological qualities. The latter are negatively influenced by the rust disease, causing an increase both in the grain coating percentage and time of cooking. Copyright 1972, Biological Abstracts, Inc.
W73-07115

EFFECT OF MOISTURE STRESS AT DIFFERENT STAGES OF GROWTH: II. CYTOPLASMIC MALE-STERILE CORN,
Iowa State Univ., Davenport. Cooperative Extension Service.
G. B. Vincent, and D. G. Wooley.
Agronomy Journal, vol 64, no 5, p 599-602, Sept-Oct, 1972, 4 fig, 2 tab, 12 ref.

Descriptors: *Moisture stress, *Plant growth, *Corn (Field), *Corp response, *Soil moisture, Seeds, Labor, Drought tolerance, Soil-water-plant relationships, Growth stages, Crop production, Leaves, Water management (Applied), Adaptation, Water demand, Consumptive use, Water conservation.
Identifiers: *Cytoplasmic male-sterile corn, *Hybrids, *Leaf turgor.

Cytoplasmic male-sterile (cms) corn (Zea mays) hybrids are used extensively in recent years by commercial seed producers to reduce labor. This study determines if the greater moisture stress-tolerance of corn plants with male-sterile cytoplasm was due to their ability to extract more moisture from soil and retain it against atmospheric demand. Experiment was conducted on Colo silt loam soil in 1967 at Ames, Iowa to compare effects of moisture stress at different stages of growth on Texas male-sterile cytoplasm corn hybrids and their normal cytoplasm counterparts. Grain yield reduced significantly by imposed moisture stress. Hybrids with cms did not yield differently from normal counterparts, but cms hybrids maintained a higher leaf turgor level when stressed. Equally severe stress intensities were established by withholding irrigation water until a minimum level of 75 percent leaf turgidity was reached. Normal hybrids withstood 1 day of serious stress during a 3-day period, while cms hybrids withstood 3 days of serious stress during a 10-day period before reaching minimum leaf turgidity. The stress-tolerant cms hybrids have significant impact on water managment and adaptation of corn plants. (Popkin-Arizona)
W73-07117

THE INITIAL LEACHING OF HAYED-OFF PASTURE PLANTS IN RELATION TO THE RECYCLING OF PHOSPHORUS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 02I.
W73-07118

A GREENING IN THE ARAB EAST,
J. Fitchett.
Aramco World Magazine, Vol 23, No 6, p 24-32, November-December 1972, 22 fig.

Descriptors: *Agronomic crops, *Crop production, *Irrigation practices, *Drainage, *Drought tolerance, Arid lands, Cultivated land, Dry farming, Clogging, Salinity, Demand, Proteins, Seeds, Oil seed crops, Feeds, Cattle, Varieties, Wheat, Barley, Corn (Field), Sorghum, Land management, Irrigated land, Fertilizers, Planting management, Plant diseases.
Identifiers: *Arid Lands Agricultural Development Program (ALAD), Buffalo gourd, Hybrid seeds, Germplasm bank, Land leveling, Millet, Maize.

Attempts to extend agriculture in the Arab east by irrigation are expensive and cause soil clogging and salinity problems when drainage is inadequate. Marginal dryland crops are not sufficient to meet expanding market demands. The Arid Lands Agricultural Development Program (ALAD) is an international effort to find agricultural solutions in the area. A buffalo gourd is a low, gray-green plant covered with a dull wax coating which may triple the Middle East's protein supply. The gourd provides seed oil and cattle feed pulp. Hybrid varieties of basic food crops as wheat, barley, maize, sorghum and millet are also being developed. Land leveling has been found to increase annual yields as much as 20 per cent. Irrigated crops are considered, though more water, more fertilizer, and thicker planting raise the risks of virulent disease. A planetary germ-plasm bank is kept consisting of catalogued seeds of wheat as a reservoir of crop characteristics. High performance hybrids and genes are sought to improve yields in the vast, unirrigated and rainfed areas. Twenty-two color photographs show ripening grain, wheat, maize and millet, experimental breeding and buffalo gourd fields. (Popkin-Arizona)
W73-07119

INTERCROPPING OF RAINY-SEASON LEGUMES IN CENCHRUS CILIARIS L. AND LASIURUS SINDICUS HENR. PASTURES IN THE ARID ZONE OF RAJASTHAN,
Central Arid Zone Research Inst., Jodphur (India).
H. S. Daulay, A. K. Chakravarty, and G. N. Bhati.
Indian Journal of Agricultural Sciences, Vol 42, No 2, p 148-151, February 1972. 1 fig, 2 tab, 1 ref.

Descriptors: *Legumes, *Pasture management, *Grasses, *Catch crops, *Forage mixtures, Beans, Dry farming, Seasonal, Arid lands, Crop production, Crop response, Range management, Farm management, Planting management.
Identifiers: Rajasthan.

It has been found necessary to develop a suitable cropping system and modify the existing one to bring stability in the farm income in the arid zone of Rajasthan. Therefore, intercropping with green gram (Phaseolus aureus Roxb.), moth-bean (P. aconitifolius Jacq.) and cluster-bean (Cyamopsis tetragonoloba (L.) Taub.) was done in sewan grass (Lasiurus sindicus Henr.) and bunch grass (Cenchrus ciliaris L.) pastures during 1966-1968. The grasses were established in 1966 (June-July) with 1-m spacing between the rows. The annual legumes were sown singly as well as in between the grass rows after the monsoon showers. Pure plots of grasses were maintained as the control. The legume crops were successful in the first two years but failed in the third year because of drought, whereas the grasses remained productive in all 3 years. The results indicated that height, branching and crown diameter of the legume plants were not adversely affected when intercropped with bunch grass. But in sewan grass association, the plant height of cluster-bean and crown diameter of moth-bean decreased in 1967-1968 only. The yield of grain and forage from legume also did not show any decrease when intercropped with grasses. Moreover, the total forage production from the intercropped plots recorded significant increase (17-36 percent) over the pure grass plots in the years of good rainfall, whereas the perennial grasses continued to yield forage even when the legume crop failed owing to drought, indicating the superiority of intercropping of legumes with grasses in the arid zone. (Black-Arizona)
W73-07122

EFFECT OF STEAMING ON YIELD AND NUTRIENT CONTENT OF TOMATOES GROWN IN THREE SUBSTRATES AND ON PHYSICAL PROPERTIES OF THE SUBSTRATE,
Foras Taluntais, Malahide (Ireland). Dept. of Glasshouse Crops and Mushrooms.
M. J. Woods, M. Prasad, and M. J. Maher.
Plant and Soil, Vol 36, p 209-213, 1972. 3 tab, 16 ref.

Descriptors: *Steam, *Crop production, *Environmental control, *Artificial substrates, *Crop response, Nutrients, Tomatoes, Greenhouses, Structures, Growth chambers, Control, Agronomy, Planting management, Peat, Plant physiology, Plant growth, Vegetable crops.

Annual steam sterilization of glasshouse soil to reduce the incidence of pathogenic organisms is a common cultural practice resulting in increased yields. However, it is not known what benefits or other effects steam sterilization might produce in peat especially over a long period of time. Studies show that steam sterilization increased the yield of tomatoes grown on peat over 3 years. The increase becomes more pronounced with time. The effect of steaming was greater in the summer crop which has a duration of 6 months than in the autumn crop which has a duration of 4 months. Similar yield patterns were evident in tomatoes grown in sand and soil. Manganese levels in the growing media and in the foliage rise as a result of steaming, but toxic levels were reached only in plants growing on steamed soil which caused yield reduction. Leaf nitrogen content was increased as a result of steaming. Steaming over three years did not cause a breakdown in the structure of the peat. Application of this method may enhance production of controlled environmental structures now being developed for arid countries. (Black-Arizona)
W73-07123

SOIL SURFACE WATER DEPLETION AND LEAF TEMPERATURE,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 07B.
W73-07131

CHEMICAL WEED CONTROL FOR THE IRRIGATED AREAS OF ARIZONA.
Arizona Univ., Tucson. Cooperative Extension Service.

Bulletin A-1, February 1973. 16 p.

Descriptors: *Agricultural chemicals, *Weed control, *Herbicides, *Application methods, *Defoliants, Weeds, Irrigated land, *Arizona, Arid lands, Agriculture, Crop production, Economic efficiency, Competition, Water conservation, Farm management, Chemicals, Chemcontrol, Foliar application, Rates of application.

Suggestions are summarized for the herbicides used to supplement other weed-control practices on Arizona croplands. Information is based on the research and experience of the University of Arizona, Agricultural Experiment Station and Cooperative Extension Service, the U.S. Department of Agriculture, the agricultural chemicals industry, and farmers in Arizona and adjacent states. Thirty-eight herbicides are listed giving their trade name and chemical name. Herbicides are categorized as to which are best suited for field crops, horticultural crops, general vegetation control, and herbicides for specific weeds. Application rates per acre, method of application, weeds controlled, and general remarks as to when and how to apply the chemicals are given. (Black-Arizona)
W73-07133

AN INTEGRATED RECONNAISSANCE SURVEY OF THE NATURAL RESOURCES IN THE ENVIRONS OF TEL-AFAR.
Institute for Applied Research on Natural Resources, Baghdad (Iraq).

Technical Report No 31. 1971. R. N. Kaul, editor, 49 p, 8 fig, 8 tab, 12 ref.

Descriptors: *Wheat, *Dry farming, Limiting factors, *Meteorological data, Planning, *Planting management, *Distribution patterns, *Environmental gradient, Environmental effects, Agronomic crops, Adaptation, Data collections, Climatology, Soil types, Evaluation, Arid lands, Agriculture.
Identifiers: *Iraq.

About three-fourths of the wheat in Iraq is grown under the rainfed conditions in the North where the amount of rainfall is the limiting factor. Since 1967, large areas in the Jazira have been brought under 'Mexipak' variety of wheat. The purpose of this study was to determine in more detail the climatic tolerance of both traditional and improved varieties and to determine the geographical distribution of these climatic characteristics within the country before the improved varieties are introduced on a large scale. Data and other information collected during the reconnaissance survey are discussed in separate chapters covering the different disciplines of climate (including main climatic features, precipitation, evaporation, temperature), soils (including earlier soil studies, soil formations, classification, soil fertility and soil types), water (including water resources and chemical composition) and discussion on natural and 'man-made' vegetation (e.g., moist steppe, dry steppe; cereal cultivation, crop varieties, crop diseases, cultural practices and land tenure). Problems have been identified and recommendations for research are given. (Black-Arizona)
W73-07134

SPRINKLER WATER DISTRIBUTION TESTING IN A DESERT ENVIRONMENT,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
L. F. Hermsmeier.
Transactions of the ASAE, American Society of Agricultural Engineers, Vol 15, No 3, p 436-439, May-June 1972. 7 fig, 2 tab, 9 ref.

Descriptors: *Sprinkler irrigation, *Distribution patterns, *Agricultural engineering, *Analytical techniques, *Measurement, *Optimization, Arid lands, Agriculture, Irrigation systems, Irrigation design, Irrigation practices, Crop production, Water management (Applied), Farm management, Evaporation, Salinity, Testing procedures, Data collections, Irrigation efficiency.

In recent years sprinkler irrigation has become more widely practiced in many arid regions. In addition to providing water for crop growth, sprinklers are being used to apply water for a variety of specialized purposes including germination, salt

control, frost protection and fertilizer and insecticide applications. Achieving uniform distribution, however, is particularly difficult with low application rate sprinklers because of their sensitivity to pressure, nozzle size, and spacing variables. A test facility for determining distribution patterns, evaporation losses and salt content changes of water for sprinkler irrigation has been constructed at the Imperial Valley Conservation Research Center, Brawley, California. Water from test sprinklers is caught in a series of catcher assemblies placed at 5-ft intervals in a square grid pattern. The test area size is 100 by 100 feet. Water for the system is supplied by a domestic water system, and uniform pressure is maintained with a booster pump and pressure regulator. Water is measured with a standard water meter. Windspeed and direction, air temperature, water temperature, and relative humidity are also measured. Sprinkler distribution patterns can be determined by one man in one-half hour plus sprinkler operation time with this system. Data collection is in the form of photographs which provide a visual representation of the distribution pattern and from which the amount of water on 0.01-in. depth increments received at 50ft square grid intervals in a 100-ft test area can be determined. The increase in time of operation for any given percentage of the field to receive a designed amount of irrigation water can be readily determined for any test condition. (Black-Arizona)
W73-07137

NOTE ON THE EFFECT OF SOIL-MOISTURE REGIMES AND LEVELS OF NITROGEN AND PHOSPHATE ON THE HCN CONTENT OF THE FIRST RATOON OF 'MF CHARI' SORGHUM (SORGHUM BICOLOR (L.) MOENCH),
Indian Grassland and Fodder Research Inst., Jhansi.
S. B. Hukkeri, R. K. Rajput, R. Mukherjee, V. Singh, and N. P. Shukla.
Indian Journal of Agricultural Sciences, Vol 42, No 7, p 648-650, July 1972. 1 tab, 1 fig, 1 ref.

Descriptors: *Toxicity, *Growth stages, *Cutting management, *Application methods, *Forage sorghum, *Crop response, Soil moisture, Regime, Nitrogen, Phosphates, Sorghum, Livestock, Plant growth, Moisture stress, Seasonal, Rhizosphere, Agricultural chemicals, Bioassay.
Identifiers: *India, Hydrocyanic acid.

Hydrocyanic acid (HCN) content in excess of 250 ppm (on dry matter basis) in the fodder is toxic to cattle. HCN content has been known to be maximum in new growth and decreases with the advancement in age of the crop. Soil moisture stress and higher levels of nitrogen application increase the HCN content in green fodder of sorghum. 'MP Chari' is a multi-cut fodder sorghum which gives 4 to 5 cuts in a growth period of about 7 months. Problems of soil moisture stress in the production of fodder sorghum is more pronounced during the hot dry summer months (April to June). This study was conducted to assess the effect of soil moisture regimes and levels of nitrogen and phosphate on the HCN content of the first ratoon crop of 'MP Chari'. Maintenance of soil moisture at and above 50 percent available soil moisture at a root depth of 15-30 cm resulted in significant reduction in the HCN content at 30th day of first ratoon growth when compared with soil moisture supply at 25 percent available soil moisture. In the 40th day of regrowth, the HCN content decreased with the increase in soil moisture supply and the difference in HCN content under 75 and 25 percent available soil moisture treatments was statistically significant. At 50th day of regrowth, moisture regimes showed no differential effect on HCN content of green fodder. Different levels of nitrogen revealed the absence of statistically differential effect on the HCN content at any of the stages of ratoon growth studied. Phosphate application at 50 kg P2O5 per ha significantly reduced the HCN content in the fodder at the 30th and 40th day of ratoon growth over no application of phosphate. Application of higher levels of phosphate (100 kg P2O5 per ha) showed no additional advantage in this respect. At 50th day stage of regrowth, phosphate application showed no differential effect on HCN content of green fodder. (Black-Arizona)
W73-07141

WINERY'S DRIP IRRIGATION SYSTEM HIGHLY SUCCESSFUL.

Ground Water Age, Vol 7, No 5, p 26-29, January 1973. 3 fig.

Descriptors: *Vine crops, *Irrigation efficiency, *Scheduling, *Water management (Applied), Irrigation systems, *Optimization, Timing, Regulation, Water conservation, Root zone, Irrigation programs, Irrigation practices, Erosion control, Evaporation control, Farm management, Filtration, Tensiometers, Surface irrigation, Regulated flow, Irrigation effects, Crop production, Irrigation design, Water delivery, Control systems.
Identifiers: *Drip irrigation.

A drip irrigation system has been installed at the Buena Vista Winery near Sonoma, California. Over 192 miles of tubing provide 145,000 vines with individual irrigation emitting one gallon of water per hour at the base of each vine. Irrigation is almost daily to insure constant wetness for the root zone of the vine. Surface run-off is eliminated, evaporation losses are minimal, and no water is wasted on weeds between the rows. Since rows between vines remain dry, concurrent cultivation is possible. Drip irrigation emitters provide all vines with a completely uniform water supply regardless of elevation or location in the vineyard. Water filtration is highly critical as emitters otherwise become clogged. The filtering system forces water through three concentric ring elements which decrease successively in mesh size. Thirty tensiometers are located throughout the vineyard to determine drip irrigation schedules. About eighty gallons of water per vine per season are used. There is some salt buildup since this water is applied directly at the base of the vine, rather than across the entire field as with overhead sprinkler systems. However, with a normal fifteen inches of rainfall, this salt is leached out. Far less water has been used than was originally anticipated, serving to conserve irrigation water which is entirely supplied by a catch basin reservoir. (Black-Arizona)
W73-07142

COMPARISONS OF DRIP, FURROW, AND SPRINKLER IRRIGATION,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
L. Berstein, and L. E. Francois.
Soil Science, Vol 115, No 1, p 73-86. 1973. 6 tab, 8 fig, 15 ref.

Descriptors: *Furrow irrigation, *Sprinkler irrigation, *Comparative productivity, *Irrigation efficiency, *Application methods, Saline water, Agriculture, Irrigation design, Soil science, Crop production, Water utilization, Water requirements, Frequency, Growth stages, Agronomy, Agronomic crops.
Identifiers: *Drip irrigation.

Studies were initiated in 1970 to determine the relative merits of drip, furrow, and sprinkler irrigation methods with respect to yield potential, salinity hazards, and efficiency of water use. The bell pepper (Capsicum frutescens var. Oakview Wonder), was chosen as the experimental plant. When the same amount of low-salinity water (450 mg/l total salts) was applied by the three methods of irrigation in a first experiment, the drip-irrigated plots out-yielded the furrow- and sprinkler-irrigated ones by about 50 percent. Brackish irrigation water (2450 mg/l total salts) caused only a 14 percent reduction in yield with drip irrigation but 54 and 94 percent reductions in yield for furrow- and sprinkler-irrigated plots, respectively. When irrigation frequency was increased for furrow and sprinkler treatments in a second experiment, yield differences decreased markedly, virtually disappearing with the low-salinity water, while the brackish water caused 18 to 59 percent yield reductions for the furrow- and sprinkler-irrigated plots, respectively. Drip irrigation required about one-third less water than furrow irrigation for maximum yield of the annual bell pepper crop. The saving of water occurred while the crop was young. For mature crops, water requirements by the three methods of irrigation are similar. (Black-Arizona)
W73-07145

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

ECONOMIC, POLLTICAL AND LEGAL ASPECTS OF COLORADO WATER LAW,
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 06E.
W73-06511

ECOLOGICAL IMPACT OF SURFACE WATER IMPOUNDMENTS IN THE GREAT PLAINS AREA,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 06G.
W73-06528

PROCEDURE IN THE DEVELOPMENT OF INTERNATIONAL DRAINAGE BASINS,
British Columbia Univ., Vancouver. School of Law.
For primary bibliographic entry see Field 06E.
W73-06541

INJUNCTION--DIVERSION OF WATER BY CITY,
For primary bibliographic entry see Field 06E.
W73-06545

FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06F.
W73-06576

MAINTENANCE DREDGING, ANDREWS RIVER, MASSACHUSETTS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08B.
W73-06577

COMPREHENSIVE BASIN STUDY, BIG MUDDY RIVER, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Water Resources Council, Washington, D.C.

Available from the National Technical Information Service as EIS-IL-72-4883-F, $3.25 in paper copy, $0.95 in microfiche. July 7, 1972. 23 p, 1 tab.

Descriptors: *Illinois, *River basins, *River basin development, *Watershed management, *Environmental effects, Basins, Water resources, Environmental quality, Regional development, Channeling, Streamflow, Reservoirs, Land management, Channel improvements, Flood control.
Identifiers: *Environmental Impact Statements, *Big Muddy River (Ill).

A proposed plan of improvement for the near-future and long-range development and management of the Big Muddy River Basin's water and related land resources and the program necessary to meet the area's immediate needs within the next 10 to 15 years are presented. This early action program is comprehensive in nature and is responsive to a multiple-objective framework which includes national economic development, improvement in the quality of the environment, the betterment in the quality of life, and the stimulation of regional development. A detailed and comprehensive description of the project, environmental impacts, adverse environmental impacts, alternatives to the program, and comments requested from concerned officials are presented. Evaluations with reference to the commitment of resources and its long-range effects are also discussed in some detail. (Mockler-Florida)
W73-06578

U.S. DEEPWATER PORT STUDY--SUMMARY AND CONCLUSIONS.
Robert R. Nathan Associates, Inc, Washington, DC.
For primary bibliographic entry see Field 08A.
W73-06711

U. S. DEEPWATER PORT STUDY--PHYSICAL COAST AND PORT CHARACTERISTICS, AND SELECTED DEEPWATER PORT ALTERNATIVES.
Nathan (Robert R.) Associates, Inc., Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-06713

GENERALIZED STREAMFLOW RELATIONS OF THE SAN BERNARDINO AND EASTERN SAN GABRIEL MOUNTAINS, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
M. W. Busby, and G. T. Hirashima.
Geological Survey open-file report, October 19, 1972. 75 p, 9 fig, 6 tab, 24 ref, 4 append.

Descriptors: *Streamflow forecasting, *Flow characteristics, *Statistical methods, *California, Hydrologic data, Correlation analysis, Mathematical studies, Equations, Channel morphology, Drainage patterns (Geologic), Regression analysis.

Generalized relations for surface-water flow characteristics were developed for the San Bernardino and the eastern San Gabriel Mountains, California, within the Santa Ana River drainage. Flow characteristics were related to various sets of eight basin characteristics by a statistical correlation method. The 26 streamflow characteristics represented high, low, and medium flows. The developed relations allow estimation of any of the flow characteristics for any stream site whether gaged or ungaged within the study area. The statistical errors of estimation involved in using the relations are presented to allow evaluation of the estimated flow characteristics. (Woodard-USGS)
W73-06724

ESTIMATION OF 100-YEAR FLOOD MAGNITUDES AT UNGAGED SITES,
Geological Survey, Arlington, Va.
C. H. Hardison.
Geological Survey open-file report, February 1973. 10 p, 1 tab.

Descriptors: *Streamflow forecasting, *Floods, *Flood frequency, *Flood recurrence interval, Regression analysis, Correlation analysis, Frequency curves, Mathematical models.
Identifiers: *Ungaged streams.

A simple technique is presented for estimating the 100-year peak flood discharge at ungaged sites where discharges of flood peaks having recurrence intervals of 50 years or less can be estimated by techniques provided in earlier U.S. Geological Survey reports. Magnitudes of 100-year flood peaks are estimated by multiplying the magnitude of a smaller size peak times a ratio. The ratios tabulated in this report were extrapolated from flood-frequency curves contained in USGS Water Supply Papers representing various regions of the United States. For some local regions, recent USGS reports have presented relations for estimating 50-year floods. These ratios given in a table are for use with those estimates where available. Ratios for estimating 50-year flood peaks are tabulated for local regions. (Woodard-USGS)
W73-06726

'INFLATABLE' DAMS CONTROL CHLORIDE INTRUSION,
For primary bibliographic entry see Field 05G.
W73-06798

PROBLEMS IN RIVER HYDROLOGY AND FLOW DYNAMICS (VOPROSY GIDROLOGII REK I DINAMIKI POTOKOV).
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 02J.
W73-06801

HYDROLOGIC NATURE OF MUDFLOWS IN ARMENIA AND A METHOD FOR FORECASTING MUDFLOW HAZARD (GIDROLOGICHESKAYA PRIRODA SELEY V ARMYANSKOY SSR I METOD PROGNOZA SELEOPASNOSTI),
For primary bibliographic entry see Field 02J.
W73-06802

A CONTRIBUTION TO THE METHOD OF PREDICTING WATER TURBIDITY (K METODIKE PROGNOZA MUTNOSTI VODY),
For primary bibliographic entry see Field 02J.
W73-06804

SINKHOLE,
Geological Survey, University, Ala.
P. E. LaMoreaux, and W. M. Warren.
Geotimes, Vol 18, No 3, p 15, March, 1973. 3 photo.

Descriptors: *Sinks, *Alabama, *Karst hydrology, *Withdrawal, *Hydrogeology, Karst, Water levels, Subsidence, Land subsidence, Water table, Limestones, Subsurface drainage.
Identifiers: Shelby County (Ala).

A sinkhole crater about 140 m long, 115 m wide, and 50 m deep formed on Dec. 2, 1972 in Alabama. This is the largest recent sinkhole in Alabama. In Shelby County, Ala. about 1,000 sinkholes and internal drainage features have formed. Most of the sinks are in a limestone valley where solution activity and subsurface soil erosion are pronounced. The collapse occurred in residual clays; bedrock is not exposed. Sinkhole collapses are related to natural and manmade phenomena such as heavy rainfall, seasonal fluctuations in the water table, earthquakes, other changes in the hydrogeologic regime, artificial drainage, dewatering, mechanical chocks, breaks in water or sewage pipes, or overwatering of gardens. Formation of sinkholes often results from spalling, or downward migration of clay through openings in underlying rocks. The spalling and formation of cavities is caused by (or may be accelerated by) lowering of the water table resulting in loss of support to clay, fluctuation of the water table against the base of residual clay, downward movement of surface water through openings in the clay, or increase in water velocity caused by increased pumping. The large collapse is in an area that may be affected by extensive groundwater withdrawal. (Knapp-USGS)
W73-06810

EXPERIMENTAL DEVELOPMENT OF HEADWARD GROWTH OF CHANNEL NETWORKS,
State Univ. of New York, Binghamton. Dept. of Geology.
For primary bibliographic entry see Field 08D.
W73-06823

SOME CALCULATIONS ON THE FREE OSCILLATIONS OF NON-ROTATING PARABOLIC BASINS,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
K. B. Yuen.
Manuscript Report Series No 26, 1972. 16 p, 2 fig, 2 tab, 7 ref.

Descriptors: *Streamflow, *Flow characteristics, *Streamflow forecasting, Numerical analysis, Correlation analysis, Channel morphology, Depth, Analytical techniques, Evaluation, Canada, Equations, River basins.
Identifiers: Free oscillations, Nonrotating parabolic basins.

The free oscillations in narrow nonrotating lakes of parabolic and other longitudinal depth profiles have been examined by Chrystal (1905). A study was made to verify by direct numerical integration, Chrystal's solutions for fully-parabolic, half-parabolic and constant-depth basins of constant width with zero rotation and to examine the intermediate cases. A basin was arbitrarily chosen with a total length of 200 kilometers and a maximum depth of 100 meters. The profiles for the parabolic case are Legendre polynomials of integral order relative to the center of the basin, while for the semi-parabolic case the profiles are the even-ordered functions. It is possible to obtain a quick estimate of the free periods of a real basin by interpolation from the results. For basins of finite width the frequencies may be approximately corrected for rotation by interpolation of Rao's (1966) results. Merian's formula has been used to obtain estimates of the frequencies of basins but numerous cases show that such results differ from observations by as much as 15% to 20%. (Woodard-USGS)
W73-06828

PROSPECTIVE USE OF CASPIAN WATER FOR SOIL RECLAMATION (IN RUSSIAN),
V. N. Kravchuk.
Izv Akad Nauk Turkm SSR Ser Biol Nauk. 1. p 82-83, 1972. English summary.
Identifiers: Bean-D, *Caspian Sea water, Cereals, Drought, Massifs, Land reclamation, Sands, Soils.

Caspian Sea water can be used for reclamation of vast sandy massifs of the Turkmen sea coast during the drought years. The soil can be stabilized by means of planting cereals and bean plants.--Copyright 1972, Biological Abstracts, Inc.
W73-06888

REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE.
Cahn, Inc., New Haven, Conn.
For primary bibliographic entry see Field 05D.
W73-06911

COMPREHENSIVE SANITARY SEWERAGE AND STORM DRAINAGE FACILITIES PLAN

FOR THE INCORPORATED COMMUNITIES, PREPARED FOR LIMA - ALLEN COUNTY REGIONAL PLANNING COMMISSION.
Browne (Floyd G.) and Associates Ltd., Marion, Ohio.
For primary bibliographic entry see Field 05G.
W73-06917

MARSH BUILDING WITH DREDGE SPOIL IN NORTH CAROLINA,
W. W. Woodhouse, Jr. , E. D. Seneca, and S. W. Broome.
Army Coastal Engineering Research Center Reprint. CERC-R-2-72. Reprint of North Carolina Agricultural Experiment Station Bulletin 445, July 1972.

Descriptors: *Marsh management, *Marsh plants, *Dredging, *Soil stabilization, Sounds, Estuaries, Channel improvements, *North Carolina, Erosion control, Sediment control, Plant growth, Methodology.
Identifiers: *Spartina alterniflora Loisel, Dredge spoil.

The U.S. Army Corps of Engineers maintains approximately 1,500 miles of channels in North Carolina sounds and estuaries. Much of the material removed in this operation eventually finds its way back into these channels. Therefore, the possibility appears to exist of combining two desirable objectives in one operation ± the stabilization of dredge spoil and the establishment of new tidal marsh. Work was initiated in the fall of 1969 along the North Carolina coastaon the stabilization of dredge spoil with Spartina alterniflora Loisel. Studies included methods of propagation and establishment, growth rates, factors affecting growth, and substrate and elevational effects. Reasonably satisfactory methods and procedures have been developed and some tentative guidelines formulated for the use of this plant for stabilization of dredge spoil. The establishment of new S. alterniflora marsh on some spoil areas is feasible with complete cover to be expected in two growing seasons. Establishment of this species is possible by means of either seeds or transplants. Direct seeding appears to offer a very rapid and relatively economical route to establishment on and stabilization of areas meeting certain standards. (Woodard-USGS)
W73-06953

THEORETICAL FREQUENCY DISTRIBUTIONS FOR THE ANALYSIS OF PLAINS STREAMFLOW,
York Univ., Downsview (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 02E.
W73-06959

ESTIMATING TRADE-OFFS BETWEEN SEDIMENTATION AND FARM INCOME,
Illinois University, Urbana. Dept. of Agricultural Economics.
A. V. S. Narayanan, and E. R. Swanson.
Journal of Soil and Water Conservation, Vol 27, No 6, p 262-264, November-December 1972. 1 fig, 4 tab, 17 ref. OWRR B-049-ILL (3). 14-31-0001-3272.

Descriptors: *Watersheds (Basins), *Linear programming, *Farm management, *Reservoir silting, Sedimentation, Sediment control, *Income, *Soil conservation, Cultivation, Cost-benefit analysis.
Identifiers: Soil loss.

A 1,200-acre watershed with a planned recreational reservoir was studied to determine (by linear programming) maximum farm income for various levels of sedimentation. Shifts to conservation tillage methods permitted maintenance of farm income with reservoir sediment reductions of more than one-half. The sacrifice in farm income necessary to reduce sedimentation by various amounts is an important factor in determing public policy with regard to soil loss from farms.
W73-07025

A COMPARATIVE STUDY ON FLOOD ROUTING COMPUTATION,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W73-07026

THE MAGNITUDE OF SNOWMELT AND RAINFALL INTERCEPTION BY LITTER IN LODGEPOLE PINE AND SPRUCE-FIR FORESTS IN WYOMING,
Wyoming Univ., Laramie. Dept. of Botany.
J. F. Reynolds, and D. H. Knight.
Northwest Science, Vol 47, No 1, p 50-60, 1973. 2 fig, 5 tab, 22 ref. OWRR A-001-WYO (10).

Descriptors: *Litter, Forests, Forest management, Water yield, Water loss, *Snowmelt, Hydrologic cycle, *Rainfall, *Wyoming, Evaporation, *Interception, Rocky Mountain region, *Lodgepole pine trees, Pinus contorta.
Identifiers: *Spruce-fir forest, *Medicine Bow Mts (Wyo).

Water interception by litter during snowmelt and rainshower periods has been studied in lodgepole pine and spruce-fir forest communities in the Medicine Bow Mountains, southeastern Wyoming. Stands were sampled to determine litter weight and various hydrologic properties of the litter, including maximum available storage capacity, drying rates, and hydrophobic tendencies of the litter. Lodgepole pine litter was found to have a maximum available storage capacity of about 0.33 inch compared to 0.41 inch in spruce-fir. Approximately 85 acre feet of snowmelt water is evaporated from 2.709 acres of forest floor in the study area. Canopy and litter interception significantly reduce the opportunity for soil moisture recharge from rainfall.
W73-07032

A TECHNIQUE FOR EVALUATING ALGAL GROWTH POTENTIAL IN ILLINOIS SURFACE WATERS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05C.
W73-07040

LOW-FLOW INVESTIGATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-07052

CHANGE IN PHYSICOCHEMICAL PROPERTIES OF INFILTRATION WATERS OF THE KIEV RESERVOIR AND THEIR EFFECT ON PRODUCTIVITY OF PINE FORESTS, (IN RUSSIAN),
I. O. Davydenko, and V. V. Akhremenko.
UKR Bot Zh. Vol 28, No 1, p 113-117. 1971. English summary.
Identifiers: Acidity, Forests, Hydrological studies, Infiltration, *Kiev Reservoir, Mineralization, *Physicochemical properties, *Pine-G, Productivity, Reservoirs, Soils, USSR.

The concentration of Ca, K, and Mg ions, as well as the total mineralization, decreased and the actual acidity increased. The growth of pine trees increased after the construction of the reservoir and raising the water level; this was conditioned by the improvement of the hydrological regime of soil and the physicochemical properties of the infiltrated waters which were the suppliers of nutrients.–Copyright 1972, Biological Abstracts, Inc.
W73-07086

INTERRELATIONSHIPS BETWEEN SITE FACTORS AND PRODUCTIVITY OF RADIATA PINE AT RIVERHEAD FOREST, NEW ZEALAND,
New Zealand Forest Service, Rotoura.
R. Ballard.
Plant Soil. Vol 35, No 2, p 371-380. 1971.
Identifiers: Drainage, Forests, Interrelationships, Mycorrhizae, New Zealand, Phosphorus, Pines, *Pinus radiata G, *Productivity, *Sites, Soils, Hydrogen ion concentration, Riverhead Forest.

Significant simple correlations were found between productivity of radiata pine (Pinus radiata D. Don.) growing on known P-deficient soils and available soil P, mycorrhizae, slope, aspect, pH, and drainage. However, partial and multiple correlations showed that available soil P, mycorrhizae, fine sand, clay and slope were the only measured variables to make a significant independent contribution towards explaining variation in productivity. Aspect and pH were found to be related to productivity indirectly through their interrelationship with available soil P, and drainage indirectly through its interrelationship with mycorrhizae. The failure of clay and fine sand to show a significant simple correlation with productivity despite contributing independently to variation in productivity was attributed to their effects being more pronounced within specific levels of other variables than over their complete range.–Copyright 1972, Biological Abstracts, Inc.
W73-07088

FORESTS AND EROSION IN CHINA, 1922-1927,
For primary bibliographic entry see Field 02J.
W73-07112

YIELD AND PERCENTAGES OF CRUDE PROTEIN AND GREEN HERBAGE IN WEEPING LOVEGRASS UTILIZED FOR DEFERRED GRAZING IN SEMIARID ARGENTINA,
Kentucky Univ., Lexington. Dept. of Agronomy.
R. R. Vera, E. E. Menvielle, and W. C. Templeton, Jr.
Agronomy Journal, Vol 64, No 6, p 757-758. November-December 1972. 3 tab, 1 fig, 7 ref.

Descriptors: *Crop production, *Forages, *Nitrogen compound, *Fertilizers, *Semiarid climates, Proteins, Grazing, Experimental farms, Ureas, Harvesting, Fertilization, Pastures, Winter, Summer, Climates.
Identifiers: *Herbages, *Lovegrass, Dry matter, *Argentina.

Weeping lovegrass is becoming an increasingly important forage crop in the semiarid region of Argentina. A 2-year field trial was contracted to ascertain effects of nitrogen (N) fertilization on yield and two crop quality indicators, owing to the paucity of information on the lovegrass (Eragrostis curvula (Schrad)). Two N levels 0 and 70 kg/ha, were applied as urea in February. Time of harvest was a second experimental variable. N fertilization increased herbage crude protein from 6.7 to 8.5 percent during winter, and resulted in 69 percent more forage, with no effect on relative proportions of green and dead herbage. Dry-matter yields did not increase after April 1, 1970, but maximum yields for 1971 occurred in the May harvest. Crude protein percentages were 10 and 13 for the unfertilized and fertilized plots respectively at the April 1 harvest, and declined rapidly during April and May. During winter, accumulated weeping lovegrass herbage from unfertilized fields is not likely to meet nutrient requirements of grazing animals under prevalent climatic conditions in Argentina. Useful means of filling forage deficits at critical times are summer N fertilization, in winter alternative crops and feed supplementation. Rye and other cool-season plants, and store-feed supplementation are suggested. (Popkin-Arizona)
W73-07113

ESTIMATING STREAMFLOW USING THORNTHWAITE'S CLIMATIC WATER--BALANCE,
Hull Univ. (England).
For primary bibliographic entry see Field 02A.
W73-07120

TANGLEHEAD--A DUAL PURPOSE GRASS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
D. E. Ward, and S. C. Martin.
Arizona Cattlelog, Vol 28, No 8, p 18-20, August 1972.

Descriptors: *Range management, *Erosion control, *Range grasses, *Soil stabilization, *Gully erosion, *Rill erosion, Forage palatability, *Soil erosion, Forage palatability, Southwest U.S., Arizona, Grazing, Livestock, Curing, Arid lands, Revegetation, Soil conservation, Vegetation establishment, Monocots, Land reclamation.

Range grasses should serve at least two purposes: forage production and erosion control. Tanglehead (Heteropogon contortus) is a warm-season perennial bunchgrass native to the Southwest. It occurs in the 12 to 18 inch rainfall belt at elevations between 1,000 and 5,500 feet, and grows on a variety of soils. Tanglehead is rated relatively low in forage quality due to its low palatability and nutritive value during most of the year. However, it provides valuable emergency forage as it cures well and is resistant to weathering, and is readily grazed if not mixed with too much dead material. Its main value lies in its ability to control rill and gully erosion by producing dense stands of seedlings in areas where extra moisture is available. In this case, the relative low palatability enables it to accumulate along the watercourses and establish itself due to less grazing pressure. (Black-Arizona)
W73-07121

INTERCROPPING OF RAINY-SEASON LEGUMES IN CENCHRUS CILIARIS L. AND LASIURUS SINDICUS HENR. PASTURES IN THE ARID ZONE OF RAJASTHAN,
Central Arid Zone Research Inst., Jodphur (India).
For primary bibliographic entry see Field 03F.
W73-07122

CHEMICAL WEED CONTROL FOR THE IRRIGATED AREAS OF ARIZONA.
Arizona Univ., Tucson. Cooperative Extension Service.
For primary bibliographic entry see Field 03F.
W73-07133

ASPECTS OF DRAINAGE AND LAND RECLAMATION IN THE LOWER MESOPOTAMIAN PLAIN. A PROBLEM ANALYSIS,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
R. van Aart.
Technical Bulletin 34, March 1972. 23 p, 2 fig, 3 tab, 19 ref.

Descriptors: *Drainage, *Land reclamation, *Land use, *Regional analysis, *Saturated soils, Dams, Saline soils, Salinity, Wetlands, Agriculture, Cultivation, Evaluation, Planning, Water resource development, Groundwater, Alkaline soils, Permeability, Soil investigations, Drainage effects, Land development.
Identifiers: *Iraq.

The oldest form of any primitive reclamation practice in the world is ascribed to the Sumerians who reclaimed land as early as 3000 BC by bordering tracts in the marshes of the delta plain with low earthen dams and draining them. The first appearance of salinity was attributed to the same era. A decline in the agricultural prosperity was noted and an overall shift in land use took place changing from annual winter cultivation (mainly) to a system of fallow land rotation. The objective of this study is to contribute to a better understanding of the problems of waterlogging and salinization, to delineate why so many failures took place in the implementation of the land reclamation schemes, and to give some broad lines along which any future reclamation activity should proceed. A summary is included of the physiography, soil, climate, vegetation, hydrology, and salinity of the Plains. Problems of waterlogging and salinization can be solved best by control of the water table (drainage), and subsequent desalinization, dealkalinization and cropping (reclamation). Drainage criteria are outlined and permeability of the soil is analyzed in detail. (Black-Arizona)
W73-07135

INFLUENCES OF A FOREST ON THE HYDRAULIC GEOMETRY OF TWO MOUNTAIN STREAMS,
Forest Service (USDA), Albuquerque, N. Mex. Rocky Mountain Forest and Range Experiment Station.
B. H. Heede.
Water Resources Bulletin, Vol 8, No 3, p 523-530, June 1972. 2 fig, 4 tab, 9 ref.

Descriptors: *Channel morphology, *Flow rates, *Equilibrium, *Forest management, *Flow profiles, *Gradients (Streams), *Streamflow, Streams, Colorado River, Colorado, Rocky Mountain region, Management, Planning, Evaluation, Environmental effects, Hydraulic gradient, Water resources development, Running waters, Natural streams, Headwaters, Stream fisheries.
Identifiers: Stream hydraulics.

With increasing demands for water, manipulation of the small mountain streams can be expected to increase also. Very little is known about influences of forests on stream hydraulics. To assess these effects, the influence of a forest on the formation of steps in two small streams of the Colorado Rocky Mountains was studied. Steps provided by logs fallen across the channel added to flow energy reduction. The streams required additional gravel bars to adjust to slope. Average step length between logs and gravel bars was strongly related to channel gradient and median bed material size. Based on the average number of log steps per 50 feet of channel, an average of 116 percent of gravel bars were added at Fool Creek and 60 percent at Deadhorse Creek. The latter had 52 percent more logs in the channel and therefore required less bed material movement than the former. Although these are 'rushing mountain streams', most flow velocities ranged between 0.5 and 2.5 f.p.s. Exponents of a function relating rate of change of depth or velocity to discharge indicated that dynamic stream equilibrium was attained. Implications for forest management are that sanitation cuts (removal of dead and dying trees) would not be permissible where a stream is in dynamic equilibrium and bed material movement should be minimized. (Black-Arizona)
W73-07138

4B. Groundwater Management

A COMPUTERIZED PROCEDURE TO DETERMINE AQUIFER CHARACTERISTICS,
Texas Tech Univ., Lubbock. Dept. of Civil Engineering.
T. R. Knowles, B. J. Claborn, and D. M. Wells.
Available from the National Technical Information Service as PB-217 865, $5.45 in paper copy, $0.95 in microfiche. Texas Water Resources Center, Lubbock, Report WRC-72-5, December 1972. 103 p, 16 fig, 6 tab, 20 ref, 2 append. OWRR (C-2101 (3363) (1).

Descriptors: *Aquifer characteristics, *Computer programs, *Permeability, *Texas, *Storage coefficient, *Optimization.
Identifiers: *Ogallala aquifer, *Steepest descent, *Iterative.

A digital computer procedure to determine aquifer parameters is developed. The values of permeability and storage coefficient at specific points were of interest rather than functions which describe the spacial distribution of these parameters. The procedure adjusts initial estimates of permeability and storage coefficient to reduce the differences between the measured and simulated water levels. The parameter adjustment procedure uses a steepest descent optimization procedure to minimize the errors in simulating water levels. The partial derivatives necessary for the steepest descent procedure are determined by differentiating the finite difference equation with respect to the aquifer parameters. The net amount of water removed from each node was included as a parameter. The adjustment procedure is iterative in that for each year the model simulates water levels, calculates simulation errors, and adjusts parameters. This procedure is repeated twice using the adjusted values of the parameters. Each year's adjustment of parameters results in a different set of parameter values. These values were averaged and the program was executed using these average values. This resulted in less simulation error than was present when the original vlues of the parameters were used.
W73-06508

GROUNDWATER - SURFACE WATER INTEGRATION STUDY IN THE GRAND PRAIRIE OF ARKANSAS,
Arkansas Univ., Fayetteville. Water Resources Research Center.
C. L. Griffis.
Available from the National Technical Information Service as PB-217 866, $3.00 in paper copy, $0.95 in microfiche. Arkansas Water Resources Research Center Publication No. 11, 1972. 25 p, 14 fig, 7 ref, append. OWRR A-010-ARK (4). 14-31-0001-3804.

Descriptors: *Mathematical models, *Model studies, *Artificial recharge, Groundwater, *Arkansas, Groundwater recharge, Water management (Applied), Recharge wells.
Identifiers: Grand Prairie (Ark), Quaternary aquifer.

A mathematical model of the Quaternary Aquifer of the Grand Prairie, Arkansas was developed and used to evaluate a variety of methods of artificially recharging this aquifer. In addition, the model was used to evaluate the impact of various levels of water management and the probable movement of artificially recharged water in the aquifer. Improved water management and the use of recharge wells were the most promising alternatives. The rate of movement of recharged water was determined by the model to be 300 ft/yr. under a gradient of 16 ft/mile.
W73-06509

SUBSURFACE AND PERCOLATING WATERS.
For primary bibliographic entry see Field 06E.
W73-06537

WE DON'T WASTE WASTES,
Saint Petersburg Street Dept., Fla.
For primary bibliographic entry see Field 05D.
W73-06603

SIGNIFICANCE OF GROUND-WATER CHEMISTRY IN PERFORMANCE OF NORTH SAHARA TUBE WELLS IN ALGERIA AND TUNISIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.

W73-06715

PROPOSED WATER-RESOURCES STUDY FOR THE MADERA AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02F.
W73-06716

WATER LEVELS AND ARTESIAN PRESSURES IN THE CHAD BASIN OF NORTHEASTERN NIGERIA, 1963-68,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-06717

GROUND WATER IN DICKENS AND KENT COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
J. G. Cronin.
Texas Water Development Board, Austin, Report 158, November 1972. 79 p, 6 fig, 8 tab, 34 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Water quality, *Texas, Water utilization, Water supply, Irrigation, Aquifers, Water yields, Withdrawal, Water level fluctuations, Data collections, Surface waters, Groundwater recharge, Hydrogeology, Well data, Hydrographs, Maps, Hydrologic data.
Identifiers: *Dickens County (Tex), *Kent County (Tex).

Dickens and Kent Counties are in the northwestern part of Texas, south of the Panhandle area. Rocks of Permian, Triassic, Cretaceous, Tertiary, and Quaternary age are exposed in the two-county area. These rocks, except those of Cretaceous age, contain the aquifers that yield water for irrigation, industrial use, public supply, domestic supply, and livestock use. The principal aquifer in most of the report area is the Quaternary alluvium. In 1964 an estimated 15,550 acre-feet of water was withdrawn from the Quaternary alluvium, of which 437 acre-feet and 13,000 acre-feet were for public supply and irrigation, respectively. Since 1966, the water supply for the city of Spur has consisted entirely of surface water; consequently, the amount of water withdrawn from the Quaternary alluvium for public supply, which was 121 acre-feet in 1968, has been reduced. The Ogallala Formation in the High Plains supplied an estimated 800 acre-feet of water for irrigation in 1964 and probably less in 1968. Water in the various aquifers ranges from fresh to very saline. (Woodard-USGS)
W73-06719

OCCURRENCE OF GROUND-WATER IN HARD ROCK FORMATIONS OF PAKISTAN,
Geological Survey of Pakistan, Quetta.
A. S. Tauqir.
Geonews, Vol 2, No 2, p 23-28, July 1972. 9 ref.

Descriptors: *Hydrogeology, *Exploration, *Groundwater resources, Mapping, Water sources, Aquifers, Aquifer characteristics.
Identifiers: *Pakistan.

In Pakistan, emphasis has been mainly on locating and exploiting alluvial aquifers while little or no attention has been paid to prospecting for groundwater in hard rock. The Geological Survey of Pakistan has recently started systematic exploration of groundwater in hard rock aquifers. Groundwater exploration in Malir, Lyari, and Baran River basins (Dadu and Karachi Districts) is in the final stages, using test drilling after completion of a preliminary geohydrologic survey and electrical resistivity survey. A second project is in Campbellpur District where preliminary groundwater survey and some geophysical investigations have been carried out. A third project is for exploration of hard-rock aquifers in Quetta Valley. Work on this project is in the initial stages. A geological party is presently engaged in preparing large scale geological and structural maps. (Knapp-USGS)
W73-06721

THE GEOLOGICAL STRUCTURE AS A GUIDE IN SEARCH FOR GROUND-WATER IN HIGHER REGION OF BALUCHISTAN,
Geological Survey of Pakistan, Quetta.
S. H. A. Shah.
Geonews, Vol 2, No 2, p 21-23, July 1972. 3 fig.

Descriptors: *Hydrogeology, *Structural geology, *Folds (Geologic), Geologic control, Groundwater resources, Geologic mapping, Stratigraphy.
Identifiers: *Baluchistan (Pakistan).

In Baluchistan a strong control on accumulation and migration of groundwater is the structural setting of the area. Interbedding of folded permeable and impermeable strata such as jointed and fissured limestone and compact shales is common. Wherever the permeable formations are exposed on the surface and underlain by impermeable strata a good reservoir for water may be found down the plunge of the fold. Wells should be sunk on the lowest point of the structure. Because of strongly seasonal recharge, the wells should be used during irrigation season only. (Knapp-USGS)
W73-06722

ION-EXCHANGE SYSTEM TO TREAT HIGH-NITRATE WELL WATER,
Bowne (Sidney B.) and Son. Mineola, N.Y.
For primary bibliographic entry see Field 05F.
W73-06741

HYDROGEOLOGY OF SOLID WASTE DISPOSAL SITES IN MADISON, WISCONSIN,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05B.
W73-06762

ON THE USE OF ALLUVIAL GROUNDWATERS FROM THE IRTYSH FLOODPLAIN IN GROUP WATERWORKS IN THE PAVLODAR REGION,
For primary bibliographic entry see Field 05F.
W73-06770

ON POLLUTION OF SUBSURFACE WATERS,
For primary bibliographic entry see Field 05B.
W73-06793

EVALUATION OF PUMPING TESTS IN PARTIALLY PENETRATING WELLS,
Komenskeho Universita, Bratislava (Czechoslovakia).
I. Mucha.
Nordic Hydrology, Vol 3, No 4, p 239-262, 1972. 9 fig, 6 ref, 3 append.

Descriptors: *Aquifer testing, *Drawdown, *Water yield, Artesian aquifers, Hydrogeology, Pumping, Aquifer characteristics, Groundwater movement, Water levels.
Identifiers: *Pumping tests.

Pumping tests in wells that partially penetrate confined aquifers may be evaluated by means of type curves and a simplified solution of nonsteady flow. The influence of skin effect on pumping tests in partially penetrating wells and the application of the method to unconfined aquifers are discussed. (Knapp-USGS)
W73-06819

GROUND-WATER INVESTIGATION FOR THE CITY OF VOLGA,
Geological Survey, Vermillion, S. Dak.
A. Barari.
South Dakota Geological Survey Special Report 51, 1971. 34 p, 5 fig, 2 tab, 5 ref, 2 append.

Descriptors: *Groundwater resources, *Groundwater availability, *Water resources development, *Test wells, *South Dakota, Boreholes, Water yield, Water quality, Water supply, Aquifers, Aquifer characteristics, Hydrogeology, Planning.
Identifiers: *Volga (S. Dak.).

An investigation was conducted from June 4 to July 3, 1969, in and around the City of Volga, Brookings County, South Dakota, to assist the city in locating a future water supply. Volga obtains its water from three wells within the city limits. These wells produce from saturated sand and gravel which is less than 15 feet thick, and the combined production of the three wells is approximately 250 gallons per minute. Included in the survey was: (1) a review and modification of the geology as mapped by Lee (1958), (2) the drilling of 65 augar and six rotary test holes, (3) a well inventory, and (4) an analysis of 16 water samples. As a result of this survey, a new area for groundwater development was discovered southwest of the city. Results of the pump test at the new site indicate that the aquifer will sustain more than one well if there is a minimum spacing of 400 feet between wells and a maximum production of 170 gpm from each. If any of the wells exceeds a yield of 170 gpm, the spacing between wells will have to be more than 400 feet. (Woodard-USGS)
W73-06820

ANALOG SIMULATION OF GROUND-WATER DEVELOPMENT OF THE SAGINAW FORMATION, LANSING METROPOLITAN AREA, MICHIGAN,
Geological Survey, Lansing, Mich.
K. E. Vanlier, and M. L. Wheeler.
Michigan Tri-County Regional Planning Commission Report, 1968. 40 p, 23 fig, 3 tab, 3 ref.

Descriptors: *Groundwater resources, *Water resources development, *Model studies, *Projections, *Michigan, Urban development, Water supply, Municipal water, Industrial water, Hydrologic data, Analog models, Forecasting.
Identifiers: *Lansing (Mich).

It is estimated that the demands for water from the Saginaw Formation for municipal, industrial, and institutional supplies in the Lansing Metropolitan area, Michigan, will total about 43 mgd in 1975 and about 57 mdg in 1985. This analog study indicates that these quantities of water are available from the formation. Although this model analysis does not include a study of the potential yield of the area can be utilized to provide an additional 7 mgd in 1975 and 15 mgd in 1985. Thus water demands of 50 mgd in 1975 and 72 mgd in 1985 can be obtained from the local groundwater resources. Since the glacial aquifers will be recharged from streamflow, the drawdown of water levels will tend to be small as a result of the availability of recharge. These drift aquifers also tend to be of small areal extent. Hence, the withdrawal of water from the glacial aquifers will not significantly affect the potential rate of withdrawal from the Saginaw Formation. (Woodard-USGS)
W73-06824

THE WATER RESOURCES OF THE RIO GRANDE DE TARCOLES BASIN, COSTA RICA,
World Meteorological Organization, San Jose (Costa Rica). Central American Hydrometeorological Project.
For primary bibliographic entry see Field 03B.
W73-06829

HYDROGEOLOGY OF FLORIDA'S LARGEST CITRUS GROVE.
Geological Survey, Tampa, Fla.
For primary bibliographic entry see Field 03F.

W73-06947

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1969-70,
Geological Survey, Tallahassee, Fla.
H. G. Healy.
Florida Bureau of Geology Information Circular No 73, 1972. 85 p, 54 fig, 1 tab.

Descriptors: *Groundwater resources, *Florida, *Water wells, *Aquifer characteristics, *Water level fluctuations, Well data, Water quality, Chlorides, Saline water intrusion, Hydrographs, Rainfall, Basic data collections, Hydrologic data.

Trends and fluctuations of groundwater levels in wells tapping the principal aquifers in Florida during 1969-70 are summarized. Hydrographs of water levels and water quality data in the several aquifers; maps showing changes in groundwater levels during specific periods; and a table summarizing the principal data on selected observation wells are included. The Floridan aquifer which underlies all of the State is the principal source of water in central, northern, and most of northwestern Florida. Highly mineralized water precludes the use of the Floridan aquifer as a source of potable water in some coastal areas and in most of southern Florida. In these areas, shallow artesian and nonartesian aquifers are the source of supply. The Biscayne aquifer in southeastern Florida is the chief source of water supply for industries, municipalities, and irrigation. The aquifer, one of the most highly productive aquifers in the world, underlies about 3,500 square miles of Broward, Dade, and Palm Beach Counties. The sand-and-gravel aquifer in extreme northwestern Florida is the principal source of water supply, yielding large supplies of groundwater for industries and municipalities. The aquifer extends beneath all of Escambia and Santa Rosa Counties and part of western Okaloosa County. (Woodard-USGS)
W73-06954

WATER TABLE DRAWDOWN DUE TO A PUMPED WELL IN AN UNCONFINED AQUIFER,
Birmingham Univ. (England). Dept. of Civil Engineering.
T. D. Streltsova, and K. R. Rushton.
Water Resources Research, Vol 9, No 1, p 236-242, February 1973. 4 fig, 2 tab, 4 ref.

Descriptors: *Groundwater movement, *Drawdown, *Withdrawal, *Unsteady flow, *Aquifer testing, Water level fluctuations, Water yield, Saturated flow, Unsaturated flow, Percolation, Capillary fringe, Capillary water, Drainage.

A general solution of the water table drawdown for unsteady radial flow to a pumped well is considered. Tabulated values for the free surface function are calculated for the range of parameters occurring in practical situations. A comparison with the available solution of Boulton is made, an appraisal of the assumptions being introduced in the derivation of the solutions. A numerical example of unsteady radial flow in an unconfined aquifer with details of the main part of the computer program is presented. (Knapp-USGS)
W73-06966

FLOW NEAR A PUMPED WELL IN AN UNCONFINED AQUIFER UNDER NONSTEADY CONDITIONS,
Birmingham Univ. (England). Dept. of Civil Engineering.
T. D. Streltsova.
Water Resources Research, Vol 9, No 1, p 227-235, February 1973. 5 fig, 1 tab, 10 ref.

Descriptors: *Groundwater movement, *Drawdown, *Withdrawal, *Unsteady flow, *Aquifer testing, Water level fluctuations, Water yield, Saturated flow, Unsaturated flow, Percolation, Capillary fringe, Capillary water, Drainage.

The problem of unsteady radial flow in an unconfined aquifer is considered as a boundary value problem with discontinuous initial conditions at the surface of the well. The discontinuity of heads occurs at the surface of the well as pumping commences; it dies down in time exponentially and this represents the delay of the transitional process of reestablishing equilibrium in time. The downward variable movement of water in the vicinity of the well resulting from this discontinuity is proportional to the difference between the gradually falling water table and the average head and is a cause of the slow draining of the unconfined aquifer. The contribution of the unsaturated zone of the aquifer in the process of slow drainage is usually of minor importance and subordinate as far as most drainage problems are concerned. Experimental verification and model design are presented. (Knapp-USGS)
W73-06967

WATER RESOURCES OF THE JOBOS AREA, PUERTO RICO--A PRELIMINARY APPRAISAL, 1962,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 02E.
W73-07039

WATER-RESOURCES RECONNAISSANCE OF ANAKTUVUK PASS, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 03B.
W73-07041

PROGRESS REPORT ON THE WATER RESOURCES INVESTIGATIONS OF DUVAL COUNTY DURING 1970,
Geological Survey, Tallahassee, Fla.
G. W. Leve.
Geological Survey open-file report, January 1971. 12 p, 7 fig.

Descriptors: *Water resources development, *Groundwater resources, *Streamflow, *Water quality, *Florida, Reviews, Hydrologic data, Data collections, Aquifers, Aquifer characteristics, Water wells, Water level fluctuations, Groundwater recharge, Saline water intrusion, Analog models, Planning.
Identifiers: *Duval County (Fla).

Field studies continued in southern Duval and northeastern Clay Counties during 1970 to delineate areas of relatively soft water in the Floridan aquifer. Water was collected from about 50 wells and anaiyzed for chloride and hardness content. A network of observation wells was established, including the installation of a continuous recorder on one well. Geologic information was compiled from well logs furnished by the Florida Bureau of Geology and by on-site collection during the drilling of seven artesian wells in the area. Collection of surface water data was continued. The stage and discharge of streams at 22 stations were measured periodically, and digital recorders were installed on three stations to obtain a continuous record. The quality of water of the St. Johns River was continuously monitored at the Main Street bridge, and values of specific conductance were obtained for several streams throughout the area. In May 1970, water levels were measured in numerous wells that penetrate the Floridan aquifer throughout the area. The cones of depression at Jacksonville and Fernandina are continuing to expand laterally. (Woodard-USGS)
W73-07042

GROUNDWATER RESOURCES OF MOREHOUSE PARISH, LOUISIANA,
Geological Survey, Baton Rouge, La.
T. H. Sanford, Jr.
Louisiana Geological Survey and Department of Public Works Water Resources Bulletin No 19, 1972. 90 p, 24 fig, 2 plate, 6 tab, 18 ref, 2 append.

Descriptors: *Groundwater resources, *Aquifers, *Water wells, Well data, *Louisiana, Water yield, Water quality, Chemical analysis, Water users, Water supply, Water demand, Aquifer characteristics, Hydrologic data, Groundwater recharge, Hydrographs, Water level fluctuations.
Identifiers: *Morehouse Parish (La).

In Morehouse Parish, La., the geologic units containing fresh-water aquifers are, in descending order, deposits of Pleistocene age and the Cockfield Formation, Cook Mountain Formation, and Sparta Sand of Eocene age. At Bastrop the water level in the Pleistocene has declined about 20 feet, and in the Sparta about 180 feet, since 1922. Yields of 1,500 gpm in the upland areas and 2,000 gpm in the Boeuf River Valley are common from wells in the Pleistocene deposits. The Pleistocene deposits contain water of the calcium magnesium bicarbonate type. This water is soft to moderately hard and slightly corrosive in the upland areas and is hard to very hard and high in iron content in the valley. In 1969 more than 52 mgd was pumped from wells, in Morehouse Parish, including 10 mgd of saline water. The trend in water use by large industries in northern Louisiana is from groundwater to surface water. (Woodard-USGS)
W73-07050

CONTRIBUTION TO THE GEOCHEMISTRY OF THE GROUNDWATER IN MERSA MATRUH AREA (WESTERN MEDITERRANEAN COASTAL ZONE, EGYPT),
Egyptian Desert Inst., Cairo.
For primary bibliographic entry see Field 02K.
W73-07146

EVALUATION OF A BASIN-WIDE STOCHASTIC MODEL FOR EPHEMERAL RUNOFF FROM SEMIARID WATERSHEDS,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 02A.
W73-07147

4C. Effects on Water of Man's Non-Water Activities

LAND USE IN THE BIG CYPRESS AREA, SOUTHERN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 07C.
W73-06825

ECOLOGICAL IMPACT OF WATER RESOURCE DEVELOPMENT--A TECHNICAL SESSION OF THE SYMPOSIUM, 'WATER, MAN, AND NATURE'.
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 05G.
W73-06847

THE EFFECTS OF HIGHWAY CONSTRUCTION ON FISH HABITAT IN THE WEBER RIVER, NEAR HENEFER, UTAH,
Brigham Young Univ., Provo, Utah. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05.
W73-06850

HYDROGEOLOGY OF FLORIDA'S LARGEST CITRUS GROVE.
Geological Survey, Tampa, Fla.

For primary bibliographic entry see Field 03F.
W73-06947

FLOODFLOW CHARACTERISTICS OF LITTLE CREEK AT STATE HIGHWAY 286, NEAR CONWAY, ARKANSAS,
Geological Survey, Little Rock, Ark.
For primary bibliographic entry see Field 02E.
W73-07037

4D. Watershed Protection

WATERSHED IMPROVEMENT DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-06535

COMPREHENSIVE BASIN STUDY, BIG MUDDY RIVER, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 04A.
W73-06578

WATERSHED PROJECTS.

Hearings--Subcomm. on Conservation and Credit--Comm. on Agriculture, U.S. House of Representatives, 92d Cong, 2d Sess, June 20, 27 and July 18, 1972.

Descriptors: *Small watersheds, *Erosion control, *Flood control, *Watershed management, Drainage programs, Cultivated lands, Land management, Sedimentation, Flood damage, Erosion, Legislation, Federal government, Wildlife conservation, Wildlife habitats, Sediment control, Streams, Channels, Channel improvement, Recreation, Flood plains, Fishing, Fish conservation, Agriculture.
Identifiers: Congressional hearings.

These hearings considered the authorization of several small watershed projects: Union Creek, South Dakota; Winnebago-Bean Creek, Nebraska; Red Lick Creek, Kentucky; Big Creek, Kansas; North Sector, Upper Walnut, Kansas; West Carroll, Louisiana; Sweetwater Creek, Tennessee; and Lake Verret, Louisiana. All of the projects, ranging in size of area affected from 12,100 acres to 248,900 acres, are to be carried out by local organizations with federal assistance. Generally, the projects are designed to reduce floodwater and sediment damage on floodplain farm land, reduce erosion, and provide for fishing and recreation facilities. Adverse effects mentioned are the elimination of agricultural use and wildlife habitat for varying amounts of land in the areas, and inundation of intermittent stream channels. Alternatives to the projects include less intensive use of floodplains, conservation land treatment without construction of floodwater retarding structures, and different combinations of structural measures, such as channel improvement. The National Wildlife Federation opposes the Lake Verret, Louisiana, and Sweetwater Creek, Tennessee, projects because it considers them unnecessary and damaging to wildlife and fish habitats. (Adams-Florida)
W73-06580

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, GREEN CREEK, BRAZOS RIVER BASIN, TEXAS, 1955-66,
Geological Survey, Austin, Tex.
B. B. Hampton.
Texas Water Development Board, Austin, Report 159, November 1972. 55 p, 23 fig, 9 tab, 23 ref.

Descriptors: *Hydrologic data, *Streamflow, *Sedimentation, *Small watersheds, *Texas, Data collections, Floods, Flood protection, Flood control, Check structures, Reservoirs, Watershed management, Precipitation (Atmospheric), Water quality, Chemical analysis, Rainfall-runoff relationships, Geology, Topography, Flood frequency, Hydrographs.
Identifiers: *Green Creek (Tex), *Brazos River Basin (Tex).

Hydrologic data were collected and compiled for the 46.1-square mile Green Creek small-watershed study area, (Brazos River basin, Texas) between 1955 and 1966. During 1954-56, eight flood water-retarding structures were constructed in the study area. The retarding structures partly control runoff from 22.3 square miles and have a combined capacity of 7,466 acre-feet below the crests of the emergency spillways. Of the 7,466 acre-feet, 1,147 acre-feet is allocated to sedimentation. In the 10-year period of study, 37% of all inflow (including rainfall on pools) to the eight reservoirs was consumed by evaporation and evapotranspiration. Moreover, this consumption ranged from 17% of inflow in 1957 to 94% in 1959, and was greater that 50% of all inflow in 5 of the 10 years studied. Chemical analyses of the water indicate that dissolved constituents probably have little or no effect upon the flocculating characteristics in relation to accelerated sedimentation. (Woodard-USGS)
W73-06720

MATHEMATICAL EVALUATION OF FACTORS AFFECTING GULLY STABILITY,
Agricultural Research Service, Columbia, Mo.
For primary bibliographic entry see Field 02J.
W73-06733

INFLUENCE OF SUMMER USE OF A MOUNTAIN WATERSHED ON BACTERIAL WATER QUALITY,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 05B.
W73-06945

FACTORS AFFECTING FLOODS FROM SMALL AND LARGE WATERSHEDS,
Hale and Kullgren, Akron, Ohio.
For primary bibliographic entry see Field 02E.
W73-06946

COMPUTER MODELING OF A CONIFEROUS FOREST WATERSHED,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 02A.
W73-06948

HYDRAULIC INVESTIGATION OF CRITICAL GRADIENTS FOR APPROACHES TO FARM WATER STORAGES,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W73-07048

THE EROSION CONTROL COMPLEX IN THE ROSTOV REGION (IN RUSSIAN),
P. S. Zakharov.
Tr Novocherk Inzh-Melior Inst. Vol 11, No 6, p 3-10. 1970.
Identifiers: Crops, *Erosion control, Fertilizers, Forestry, *Plowing, *Rostov, Slotting, Snow, *Sowing, Terracing, USSR, Wind.

The region was divided into 7 areas according to the nature and intensity of erosion. Erosion by water predominates in the northern and central areas. An important part in its control is played by plowing and sowing across slope, deep boardless plowing or subsoiling, furrowing and banking; on slopes with gradients up to 6 deg C-underwinter plowing with microbasins, slotting, terracing, crossed and close-drill sowing, snow retention, as well as ameliorative forestry practices and hydrotechnical measures. Wind erosion is predominant in the southern areas, where ameliorative forestry practices play the leading part in the complex of erosion control practices. Forest stands in these areas should occupy approx. 4% of the plowland area. Important agrotechnical practices include tillage practices, sowing of winter and early spring crops after bastard fallow, and cross sowing. Fertilizers play an important part in erosion control--Copyright 1972, Biological Abstracts, Inc.
W73-07098

FORESTS AND EROSION IN CHINA, 1922-1927,
For primary bibliographic entry see Field 02J.
W73-07112

TANGLEHEAD--A DUAL PURPOSE GRASS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04A.
W73-07121

05. WATER QUALITY MANAGEMENT AND PROTECTION

THE EFFECTS OF HIGHWAY CONSTRUCTION ON FISH HABITAT IN THE WEBER RIVER, NEAR HENEFER, UTAH,
Brigham Young Univ., Provo, Utah. Dept. of Civil Engineering.
J. R. Barton, D. A. White, P. V. Winger, and E. J. Peters.
In: Ecological Impact of Water Resources Development--A Technical Session of the Symposium 'Water, Man, and Nature': Bureau of Reclamation Report REC-ERC-72-17, p 17-28, June 1972. 8 fig, 4 tab, 13 ref.

Descriptors: *Road construction, *Environmental effects, *Fish reproduction, *Streams, *Utah, Data collections, Methodology, Sampling, Aquatic environment, Ecosystems, Engineering structures, Evaluation.
Identifiers: *Weber River (Utah).

The influence of highway construction on Weber River in northern Utah is evaluated. Data on invertebrates, fishes, and hydrology were gathered to compare areas changed by highway construction with those that were not changed by this construction work. Eight study reaches were established, four in areas that were not to be changed and four in changed areas. Structures built into changed channels of the Weber River have been effective in producing fish habitat that is comparable to, if not better than, the habitat of the unchanged sections. The decrease in the length of the river is one of the disadvantages of channelization. Where feasible, consideration should be given to maintaining the overall length of a stream. Structures made of large riprap material are often more economical and they produce good fish habitat. Invertebrates colonized the new river bottom and produced equivalent numbers and species after 6 months. Fish populations were essentially equal in changed and unchanged areas 2 years after the construction. (See also W73-06847) (Woodard-USGS)
W73-06850

5A. Identification of Pollutants

PCB IN WATER - A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.

Available from the National Technical Information Service as PB-217 859, $3.00 in paper copy,

$0.95 in microfiche. WRSIC 73-201, March 1973. 144 p.

Descriptors: *Polychlorinated biphenyls, Water pollution, *Pollutant identification, *Bibliographies, *Abstracts, *Chlorinated hydrocarbon pesticides, Documentation.

This bibliography of 88 abstracts supersedes W72-04439. It is another in a series of planned bibliographies in water resources produced from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 50,631 abstracts covering SWRA through December 15, 1972 (Volume 5, Number 24). Separate subject and author indexes are provided. (OWRR)
W73-06501

EFFECT OF STRIP-MINING ON WATER QUALITY,
Ohio State Univ., Columbus. Water Resources Center.
J. P. Vimmerstedt, J. H. Finney, and P. Sutton.
Available from the National Technical Information Service as PB-217 872, $3.00 in paper copy, $0.95 in microfiche. Ohio Water Resources Center, Columbus, Project completion Report No. 330X, 1973. 53 p, 12 fig, 9 tab, 29 ref. OWRR B-002-OHIO (1). 14-01-0001-841.

Descriptors: *Spoil banks, *Strip mine wastes, *Impaired water quality, *Sulfates, *Infiltration rates, Infiltrometers, Acid mine water, Strip mines, Coal mine wastes, Water pollution sources, Water quality, Manganese, Infiltration, Rainfall-runoff relationships, Runoff, Rainfall simulators, Ohio.
Identifiers: *Coshocton (Ohio).

Chemical water quality in Little Mill Creek was measured for 236 weeks. Two of four sampling points received effluent from a coal strip mine. Sulfate, manganese, calcium, magnesium, iron, aluminum, and hydrogen ion concentrations were determined. Average concentrations of sulfate, manganese, magnesium, and hydrogen ion were higher where streamflow included water from the mined area. Duration curves showed high concentrations of these elements occurred more frequently in streamflow affected by strip mining. Regressions of logarithm of streamflow on logarithm of chemical concentration were generally negative for weekly samples; as streamflow increased chemical concentration decreased. But high flows, sampled with a proportional sampler at the point nearest the mine, had higher average concentrations than weekly hand samples. Evidently the mined area of the watershed had a threshold raindrop energy and flow rate above which the detachment force of raindrops and velocity of flowing water could move chemicals into and through the stream system from sources unavailable to lesser storms. Rainfall infiltration on graded spoil banks, measured with a sprinkling infiltrometer, averaged about 1.5 cm per hour. Differences in moisture content, slope, bulk density, and texture of the spoil did not explain most of the difference in infiltration between spoils.
W73-06515

WATER; GROSS RADIOACTIVITY IN SURFACE WATERS OF THE UNITED STATES, APRIL 1972.
Environmental Protection Agency, Washington, D.C.

Radiation Data and Reports, Vol 13, No 12, p 685-687, December 1972. 1 tab.

Descriptors: *Water pollution sources, *Radioactivity, *Radioisotopes, *Water quality standards, *Potable water, Radioactive wastes, Public health, Water pollution effects, Springs, Nuclear wastes, Analytical techniques, Environmental effects, Environmental control, Water pollution, Mississippi River, Ohio River, Colorado River, St. Lawrence River.

Gross radioactivity in surface, ground, and treated water of the United States is monitored by the Environmental Protection Agency (EPA). Other federal, state and local agencies also operate water quality sampling and analysis program. Surveillance data from both federal and state programs are published periodically to show current and long-range trends in water radioactivity. Gross alpha and beta radioactivity results for water samples collected from ten U.S. rivers during April 1972 are included. The U.S. Public Health Service publishes acceptable standards for drinking water radioactivity. A measure of the public health importance of radioactivity levels in water can be obtained by a comparison of the observed values taken from water samples with the Public Health Service Standards which set the limits for approval of a drinking water supply containing radium-226 and strontium-90 at 3 pCi/liter and 10 pCi/liter, respectively. The rivers sampled include the Mississippi in Iowa, the Colorado River, the St. Lawrence River and the Ohio River. (Adams-Florida)
W73-06554

WATER SURVEILLANCE PROGRAMS, JANUARY-MARCH 1972.
National Environmental Research Center, Las Vegas, Nev.

Radiation Data and Reports, Vol 13, No 12, p 688-695, December 1972. 2 fig, 2 tab, 5 ref.

Descriptors: *Radioactivity, *Nuclear wastes, *Water pollution sources, *Environmental effects, Radioactive wastes, Safety, Water injury, Water pollution effects, Analytical techniques, Lakes, Ponds, Springs, Spectroscopy, Environmental control.

The National Environmental Research Center--Las Vegas, sponsored by the Environmental Protection Agency, conducts a radiological safety and environmental surveillance program in the offsite area surrounding the Nevada Test Site, and, when required by special nuclear activity, at other locations such as the Cannikan nuclear test site on Amchitka Island Alaska, and Project Rulison in Colorado. A Water Surveillance Network is established to collect one-gallon water samples from wells, open and closed springs, lakes and ponds within sampling locations situated at the Nevada Test Site and other nuclear project areas. Analytical results of water samples are reported in a bulletin on a monthly or quarterly basis. All samples are analyzed by gamma spectroscopy and counted for gross alpha and gross beta radioactivity. Analytical results for all water samples collected between January and March 1972 are presented. No gamma-emitting fission products were detected in any of the samples. (Adams-Florida)
W73-06574

RADIOLOGICAL SURVEILLANCE AROUND THE FLORIDA POWER CORPORATION'S CRYSTAL RIVER POWER REACTOR SITE, 1971.
Radiation Data and Reports, Vol 13, No 12, p 709-713, December 1972. 1 fig, 7 tab.

Descriptors: *Radioactivity, *Potable water, *Water quality standards, *Water pollution sources, *Radioisotopes, *Radioactive wastes, Rivers, Nuclear wastes, Analytical techniques, Water pollution, Environmental effects, Public health, Radioactivity effects, Air pollution, Water wells, Vegetation, Marine biology, Milk, Soil analysis, Silts, Sea water, Florida.
Identifiers: Crystal River.

The Florida Division of Health has, since May 1969, conducted radiological surveillance around the Crystal River power reactor site of the Florida Power Corporation. Samples of vegetation, milk, air particulates, drinking water, sea water, soil and silt, among other types of environmental media were collected at variously located sampling sites in the area. Results of the surveillance are presented. During 1971, 95 air particulate samples were collected and it was determined that all levels of gross beta-gamma radioactivity were less than the minimum detectable level of 1 pCi/m3. Samples of drinking water were taken from wells during February, May, August and November, while, at the same time, samples of surface water were collected. In the groundwater, the only concentration of radioactivity above the minimum detectable activity found in any of the samples was 6 pCi/liter of gross beta radioactivity. In the surface water samples, no concentration of gross alpha, gross beta, tritium or gamma-emitting radionuclides above minimum detectable activities were found except for a value of 16 pCi/liter of gross beta radioactivity in the November sample. Analysis of radioactivity in marine biota and selected types of area vegetation also is provided. (Adams-Florida)
W73-06575

IONIZATION-CHROMATOGRAPHIC METHOD OF SEPARATE DETERMINATION OF DETERGENTS IN WATER WITH PRELIMINARY PYROLYSIS, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
M. T. Dmitriev, N. A. Kitrosskii, and Z. A. Erofeeva.
Gig Sanit. Vol 36, No 8, p 77-82. 1971. Illus.
Identifiers: *Pollutant identification, *Separation techniques, Chromatography, *Detergents, Ionization, Pyrolysis.

A method of gas-chromatographic analysis of nonvolatile compounds (detergents) based on preliminary pyrolysis is described. All the investigated detergents gave characteristic, individual pyrolysis chromatograms (pyrograms) markedly differing from one another and with a sufficient number of peaks which can be used for a quantitative analysis. Copyright 1972, Biological Abstracts, Inc.
W73-06627

NATIONAL ASSESSMENT OF TRENDS IN WATER QUALITY.
Enviro Control Inc., Washington, D.C.

Available from the National Technical Information Service as PB-210 669, $3.00 in paper copy, $0.95 in microfiche. Final Report, June 1972. 48 p, 5 tab, 1 append. Contract No. EQC214.

Descriptors: *Water quality, *Nutrients, *Suspended solids, *Turbidity, *Salinity, *Conductivity, *Flow, *Forecasting, *Oxygen demand, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Phosphates, Nitrates, Nitrites, Dissolved solids, Data processing, Ammonia, Phosphorus, Nitrogen, Flow rates.
Identifiers: *Data interpretation, Organic carbon, Trends.

This study was performed for the Council on Environmental Quality to develop a new approach for assessing trends in national water quality. Data were analyzed from EPA's STORET system which contains input from 70,000 stations. The quality parameters examined were limited to those measured at least quarterly for most stations having at least 8 years of records. This restriction eliminated some important parameters such as pesticides and heavy metals. The parameters analyzed included organic indicators (DO, BOD, COD, TOC), nutrient indicators (total P, soluble P, ammonia plus organic N, and NO3 plus NO2), sediment measures (suspended solids and turbidi-

ty), and salinity measures (total dissolved solids and conductivity). Trends were analyzed as a function of flow which was felt to be the most powerful determinant of water quality. Data from 142 stations (which are not necessarily representative) satisfied the criteria established and were therefore analyzed. The analyses showed that some parameters (e.g. suspended solids and turbidity) were roughly proportional to flow, whereas others (e.g. total dissolved solids) were inversely proportional. The most significant finding was that in many cases oxygen-demanding load and nutrients were directly related to flow. Trends of the various parameters from the 142 stations are tabulated. (Little-Battelle)
W73-06628

CHARACTERIZATION OF ORGANIC COMPONENTS IN A MUNICIPAL WATER SUPPLY,
Environmental Protection Agency, Evansville, Ind.
R. D. Kleopfer, and B. J. Fairless.
Environmental Science and Technology, Vol 6, No 12, p 1036-1037, November 1972. 1 fig, 1 tab, 6 ref.

Descriptors: *Organic compounds, *Potable water, *Contaminants, *Municipal water, *Water supply, *Ohio River, Indiana, Water pollution, Gas chromatography, Mass spectrometry, Industrial wastes, Toxicity.
Identifiers: Bromodichloromethane, Toluene, Chlorodibromomethane, Tetrachloroethylene, Ethylbenzene, Xylene, Styrene, Bromoform, Bis (2-chloroethyl)ether, Bis (2 chloroisopropyl)ether, Hexachloroethane, Hexachlorobenzene, Chlorohydroxybenzophenone, Chlorinated hydrocarbons, *Evansville (Ind).

The Evansville, Inc., municipal drinking water, which is taken from the Ohio River was analyzed for organic components using carbon filter techniques. Over 40 organic compounds were detected using flame ionization gas chromatography. Thirteen of those compounds were identified with the aid of a gas chromatograph coupled with a mass spectrometer. They were: bromodichloromethane, toluene, chlorodibromomethane, tetrachloroethylene, ethylbenzene, xylene, styrene, bromoform, bis (w-chloroethyl)ether, bis (2-chloroisopropyl)ether, hexachloroethane, hexachlorobenzene, and chlorohydroxybenzophenone. The probable source of a major organic contaminant bis (2-chloroisopropyl)ether was found to be an industrial outfall located about 150 river miles upstream from the Evansville water intake. The concentration of bis (2-chloroisopropyl)ether in the Ohio River at Evansville was about twice that found in the municipal drinking water. (Little-Battelle)
W73-06629

THE ROLE OF PAPER MILL ADDITIVES AS POTENTIAL STREAM POLLUTANTS, DEVELOPMENT OF NUCLEAR TECHNIQUES,
Washington State Univ., Pullman. Coll. of Engineering Research Div.
For primary bibliographic entry see Field 05B.
W73-06637

DEVELOPMENT OF ANLAYTICAL PROCEDURES FOR DETERMINING CHLORINATED HYDROCARBON RESIDUES IN WATERS AND SEDIMENTS FROM STORAGE RESERVOIRS,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
E. T. Lyons, and H. A. Salman.
Available from the National Technical Information Service as PB-210 839, $3.00 in paper copy, $0.95 in microfiche. Report No. REC-ERC-72-15, April 1972. 10 p, 1 fig, 3 tab, 17 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Water analysis, *Sediments, *Separation techniques, *Gas chromatography, DDD, DDE, DDT, Heptachlor, Aldrin, Dieldrin, Pesticides, Analytical techniques, Chromatography, Sampling, Lakes.
Identifiers: Sample preparation, Chemical interference, Lindane, Kelthane, Heptachlor epoxide, Perthane, Endrin, Methoxychlor, Cleanup, Recovery, p p' DDD, p p DDD, p p DDE, p p DDT, p p' DDT, Lake Mead.

Analytical methods for measuring and detecting chlorinated hydrocarbon insecticides in reservoir and bottom muds are described. A seimautomatic extraction with hexane followed by gas chromatography was used to determine the presence of insecticides in water. A 16-hr soxhlet extraction using 6 percent diethyl ether in petroleum ether followed by florisil cleanup and gas chromatography gave the most reproducible results for determining insecticides in bottom muds. For both water and sediment samples, a known volume was injected into the gas chromatography, the concentration of the insecticide determined by comparing their peak heights with those of insecticide standards, and corrected for percent of recovery. Water and sediment samples taken from Lake Mead were analyzed by these methods for numerous insecticides. The water samples contained lindane at a concentration of 0.02 to 5.00 parts per billion (ppb). No other insecticides were found. No insecticides were found in the sediments; however, gas chromatograph interferences made the sediment analysis extremely difficult even after column cleanup. (Little-Battelle)
W73-06638

A PROXIMATE BIOLOGICAL SURVEY OF PEARL HARBOR, OAHU,
Naval Undersea Research and Development Center, San Diego, Calif.
For primary bibliographic entry see Field 05C.
W73-06640

DETERMINATION OF LEAD IN FISH BY FURNACE ATOMIC ABSORPTION,
Montana State Univ., Bozeman. Dept. of Chemistry.
G. K. Pagenkopf, D. R. Neuman, and R. Woodriff.
Analytical Chemistry, Vol 44, No 13, p 2248-2250, November 1972. 1 fig, 1 tab, 12 ref.

Descriptors: *Lead, *Heavy metals, *Chemical analysis, Freeze drying, Pollutant identification, Assay.
Identifiers: *Atomic absorption spectrophotometry, *Furnace atomic absorption, Graphite furnace, Detection limits, Muscle, Animal tissues, Chemical digestion, Sample preparation, Precision, Chemical interference, Absorbance.

A method is reported for lead analysis in fish using furnace atomic absorption. One to five grams of fish muscle were obtained by dissection and freeze-dried; about 1 gram of the dried tissue was weighed, digested in a mixture of concentrated nitric and perchloric acids, and the colorless samples transferred to clean volumetric flasks. Twenty microliters of the sample were placed into graphite cups which were in turn placed under an IR light and heated until the solvent evaporated. The cups were then placed in the furnace and the peak absorbances were recorded. The detection limit of the outlined method is 0.15 ng/g with an absolute sensitivity of 5.5 picograms. The accuracy of the method was evaluated using standard addition whereby a known quantity of lead was added to approximately 1-gram equivalents of dried muscle. The resulting data indicate that virtually no lead is being lost during the procedure. The procedure appears to be free of matrix effects and should be applicable to lead analysis in any biological system. (Holoman-Battelle)
W73-06641

DIRECT DETERMINATION OF MERCURY HALIDES BY ELECTRON IMPACT MASS SPECTROMETRY,
Nagoya Univ. (Japan). Dept. of Synthetic Chemistry.
K. Matsumoto, Y. Sasaki, and T. Takeuchi.
Analytical Chemistry, Vol 44, No 13, p 2246-2247, November 1972. 3 fig, 2 tab, 4 ref.

Descriptors: *Mercury, *Halides, *Pollutant identification, *Aqueous solutions, Heavy metals, Methodology, Mass spectrometry, Inorganic compounds.
Identifiers: *Electron impact mass spectrometry, *Mercury bromide, *Mercury chloride, *Mercury iodide, Precision, Sensitivity, Sample preparation, Mercury compounds, Inorganic mercury.

Mass spectra have been successfully obtained from halogenated mercury compounds as shown in the description of the quantitative determination of mercury chloride, mercury bromide and mercury iodide. Samples of the three halides were dissolved in pure ethanol and standard solutions for calibration purposes were prepared containing 10, 20, 40, 60, 80, and 100 ng of metal halides per microliter. After cooling in dry ice, the sample container tube was placed on the spectrometer probe, evacuated for 8 sec and introduced into the ion source. The peak areas obtained on the photosensitive paper by the ion current method were cut out and weighed for the quantitative determination. The results are tabulated with a listing of the relative standard deviation for each halide concentration used. It was concluded that the iodide should be used for the most sensitive determination of mercury. (Holoman-Battelle)
W73-06642

FLUOROMETRIC ASSAY OF METHYL KETONES,
Edgewood Arsenal, Md.
D. N. Kramer, L. U. Tolentino, and E. B. Hackley.
Analytical Chemistry, Vol 44, No 13, p 2243-2246, November 1972. 3 fig, 4 tab, 12 ref.

Descriptors: *Assay, *Fluorometry, *Pollutant identification, *Fluorescence, *Methodology, Organic compounds, Aqueous solutions, Chemical reactions, Anions, Cations, Alcohols, Hydrogen ion concentration, Temperature, Inorganic compounds, Chlorides, Sulfates, Nitrates, Phosphates, Carbonates.
Identifiers: *Methyl ketones, *Acetone, *Acetophenone, Organic solvents, Chemical interference, Sulfites, Acetates, Methanol, Ethanol, 1-propanol, 2-propanol, Tert-butanol, Cyclohexanone, Dimethylsulfoxide, Dimethylformamide, Acetaldehyde, Ethyl acetate, 1-indanone, Ketones.

A simple, direct method is reported for the assay of methyl ketones based on the intermediate formation of the fluorescent indoxyl. The assay was developed using acetone and acetophenone as model compounds. The procedures for the determination of the model compounds are outlined. A study carried out on the pH dependence of the rate of fluorescence formation showed that the maximum rate was at pH 12.5 and that at pH 12.3 and 12.8, the rates were lower by a factor of 2. The rate of fluorescence formation for acetone and acetophenone at 25 degree C was approximately one half of that at 50 degree C with little effect on the rate of blank formation. No effect was observed of the solvents MeOH, EtOH, i-PrOH, tert-Bu OH, n-PrOH, dioxane, and DMF on the rate of fluorescence formation. Chloride, sulfate, sulfite, nitrate, acetate, phosphate, and carbonate at 0.1 M did not affect the rate of fluorescence. Qualitative tests were negative with 1-indanone, ethyl acetate, methanol, ethanol, 1-propanol, 2-propanol, tert-butanol, cyclohexanone, dimethylsulfoxide, and dimethylformamide. Acetaldehyde gave a weak response and methyl ethyl ketone gave a positive response. Secondary alcohols, convertible to methyl ketones by oxidation, e.g.,

isopropanol, may be determined by the assay. (Holoman-Battelle)
W73-06643

ELECTRODE INDICATOR TECHNIQUE FOR MEASURING LOW LEVELS OF CYANIDE,
Orion Research, Inc., Cambridge, Mass.
M. S. Frant, J. W. Ross, Jr., and J. H. Riseman.
Analytical Chemistry, Vol 44, No 13, p 2227-2230, November 1972. 2 fig, 2 tab, 10 ref.

Descriptors: *Measurement, *Pollutant identification, *Chemical analysis, *Methodology, *Water analysis, Aqueous solutions, Waste water (Pollution), Heavy metals, Cations, Inorganic compounds, Anions, Zinc, Cadmium, Nickel, Copper, Chromium.
Identifiers: *Cyanides, *Quantitative analysis, *Silver ion electrode, Chemical interference, Metal complexes, Precision, Detection limits, Sample preparation, Ion selective electrodes, Silver, Disodium EDTA, Potentiometry, Masking.

A modified method for the analysis of individual samples for trace levels of cyanide is reported in conjunction with a masking procedure for removing metals, such as nickel, which form stable cyanide complexes. The sample conditions are outlined as follows: (1) The indicator concentration should not be more than 10 times the minimum concentration of cyanide to be detected. An indicator level of 0.0001 M permits detection of cyanide to about 0.03 ppm. (2) Samples with cyanide levels above 260 ppm should be diluted prior to analysis. (3) The sample pH should be adjusted to the range 11-12 prior to analysis. (4) Disodium EDTA is effective as a masking agent against interference by metallic ions in wastewaters and other samples. Co, Fe, Au, Ag cannot be dissociated and measured by this procedure. A number of synthetic samples were prepared and analyzed according to the outlined procedure using a silver indicator solution. Samples containing Zn, Cd, Ni, Cu, and Cr ions were treated with disodium EDTA, acidified and heated to destroy the cyanide complexes. All the potentiometric measurements were made with a silver-sensing and a double function reference electrode. The results after a series of addition experiments show that the minimum detection level was about 0.025 ppm. The use of pure KCN solutions in the presence of various metals showed that all of the cyanide originally present in the sample can be detected. The time required per analysis is about 5-10 min for these samples which do not contain inert transition metal cyanide complexes, such as Ni and Cr. Inert complexes increase the time of analysis by approximately 5-10 min per analysis. Testing has shown that the method should perform well in the analysis of both chlorinated waste waters and untreated samples. (Holoman-Battelle)
W73-06645

DETERMINATION OF PHOSPHATE, SILICATE, AND SULFATE IN NATURAL AND WASTE WATER BY ATOMIC ABSORPTION INHIBITION TITRATION,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
C. I. Lin, and C. O. Huber.
Analytical Chemistry, Vol 44, No 13, p 2200-2216, November 1972. 12 fig, 1 tab, 18 ref.

Descriptors: *Phosphates, *Silicates, *Sulfates, *Methodology, *Pollutant identification, Cations, Waste water (Pollution), Volumetric analysis, Potable water, *Water analysis, Chemical analysis, Sewage effluents, Alkali metals, Cation exchange, Anions, Sodium, Potassium, Calcium, Magnesium, Fluorides, Bicarbonates, Nitrates, Chlorides, Inorganic compounds, Regression analysis, Silica.
Identifiers: *Atomic absorption, *Inhibition titration, Natural waters, Chemical concentration, Precision, Chemical interference, Sample preparation, Ion exchange resins, Ammonium ions, Atomic absorption spectrophotometry.

The atomic absorption inhibition titration (AAIT) method was employed to study the simultaneous determination of silicate, phosphate, and sulfate with a single titration. A titration curve with three very distinct shifts in slope of linear segments was obtained. A mechanism in terms of rate processes in the droplets and particles is proposed to interpret the titration curve observed. Mathematical treatment on aspirating loss was developed and shows that such errors are limited to about 1 percent or less. A set of linear equations allows evaluation of the anion concentrations. The method was successfully applied to the analysis of tap water and lake water for silicate and sulfate, to simulated waste water for all three anions, and to commercial detergent products for phosphate. (Holoman-Battelle)
W73-06646

GRAPHIC REPRESENTATION OF NUCLEAR MAGNETIC RESONANCE CHEMICAL SHIFTS FOR THE OLEFINIC PROTONS,
National Chemical Lab. for Industry, Tokyo (Japan).
S. Yamamoto, M. Yanagisawa, H. Tomita, T. Ogawa, and Y. Senga.
Analytical Chemistry, Vol 44, No 13, p 2180-2186, November 1972. 6 fig, 2 tab, 16 ref.

Descriptors: *Pollutant identification, Organic compounds, Chemical properties, Methodology, Data collections.
Identifiers: *Chemical shifts, *Olefins, *Chemical structure, *Data interpretation, Nuclear magnetic resonance, Alkenes, Aliphatic hydrocarbons, *PMR spectra, Styrene, Acrylonitrile, Ethyl acrylate, Vinyl acetate, Methyl allylacetate, Allyl chloride, Vinyl chloride.

A graphic representation of PMR chemical shifts for the olefinic protons is presented. About 400 tau-values are compiled from about 200 spectra of olefinic compounds. The correlation charts presented provide the ranges of the olefinic proton shifts arranged according to the neighboring substituents, and make it easier to deduce chemical structures from PMR spectra. (Holoman-Battelle)
W73-06647

ELECTROSORPTION AND SEPARATION OF QUINONES ON A COLUMN OF GRAPHITE PARTICLES,
West Virginia Univ., Morgantown. Dept. of Chemistry.
J. H. Strohl, and K. L. Dunlap.
Analytical Chemistry, Vol 44, No 13, p 2166-2170, November 1972. 4 fig, 5 tab, 3 ref.

Descriptors: *Separation techniques, *Methodology, *Pollutant identification, Organic compounds, Adsorption, Aqueous solutions.
Identifiers: *Quinones, *Electrosorption, *Graphite, *Columns, Ultraviolet spectrophotometry, Thin layer chronopotentiometry, Naphthoquinones, Anthraquinones, Absorbance, Mixtures, Chemical concentration, 9 10-Anthraquinone-1-sulfonic acid, Phenanthrenequinone, Duroquinone, 2 3-Dichloro-5 6-dicyano-1 4-benzoquinone, Acenaphthenequinone, 2 3-Dichloro-1 4-naphthoquinone, 1 2-Naphtoquinone-4-sulfonic acid, 2-Hydroxy-1 4-naphthoquinone, 2-Methyl-1 4-naphthoquinone, 1 8-Dichloro-9 10-anthraquinone, 1 5-Dichloro-9 10-anthraquinone.

It is possible to adsorb certain compounds on a packed column of graphite particles by applying a potential to the column and flowing a solution of the compound through it. This adsorption can be used as a method of concentrating dilute solutions and separating mixtures of compounds. The concentration of the compounds may then be determined by an appropriate method; UV spectrophotometry of the column effluent and thin-layer chronopotentiometry of the substrate on the column were used as examples. A four-component mixture was successfully separated using the electrosorption technique and analyzed by chronopotentiometry. Several compounds were analyzed at a concentration as low as 0.5 microM. (Holoman-Battelle)
W73-06648

WATER POLLUTION: ORGANIC COMPOUNDS IN THE CHARLES RIVER, BOSTON,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
For primary bibliographic entry see Field 05B.
W73-06649

FOURIER TRANSFORM SPECTROSCOPY. NEW METHODS DRAMATICALLY IMPROVE THE SENSITIVITY OF INFRARED AND NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY,
National Inst. of Arthritis, Metabolism and Digestive Diseases, Bethesda, Md.
For primary bibliographic entry see Field 02K.
W73-06650

DETERMINATION OF TRACE AMOUNTS OF IRON (II) USING CHEMILUMINESCENCE ANALYSIS,
Federal Water Pollution Control Administration, Athens, Ga. Southeast Water Lab.
W. R. Seitz, and D. M. Hercules.
Analytical Chemistry, Vol 44, No 13, p 2143-2149, November 1972. 11 fig, 1 tab, 16 ref.

Descriptors: *Chemical analysis, *Iron, *Pollutant identification, *Water analysis, Cations, Aqueous solutions, Chemical reactions, Dissolved oxygen, Light intensity, Methodology, Heavy metals, Chelation, Copper, Manganese, Cobalt, Chromium, Nickel, Oxidation, Hydrogen ion concentration, Catalysts, Flow rates.
Identifiers: *Chemiluminescence, *Trace levels, Detection limits, Chemical interference, Complexation, Sensitivity, Precision, 5-amino- 2 3-dihydro-1 4-phthalazinedione, Luminol.

Trace amounts of Fe (II) in natural waters can be determined by a method based on Fe (II) catalysis of aqueous luminol (5-amino-2,3-dihydro-1,4-phthalazinedione) oxidation in the presence of dissolved oxygen. The quantity of Fe (II) is determined by measuring the intensity of the light emitted as a result of the oxidation reaction. Fe (II) is the only common metal ion to catalyze the luminol reaction in aqueous solutions in the presence of oxygen alone. The detection limit for Fe (II) is 0.005 microgram/l. The minimum detectable quantity is 5 picograms. Response is linear up to 50 micrograms/l. High concentrations of organic ligands reduce the intensity of light catalyzed by Fe (II) but do not affect linearity of response. Excess quantities of Cu (II), Mn (II), Co (II), Cr (III), and Ni (II) reduce the light intensity and affect linearity. Chemiluminescence analysis for total iron in natural water samples and standard orchard leaves agreed with values obtained by other methods. (Holoman-Battelle)
W73-06653

AN IMPROVED APPARATUS FOR THE FLAMELESS ATOMIC ABSORPTION DETERMINATION OF MERCURY,
California Univ., Riverside. Inst. of Geophysics and Planetary Physics.
W. A. Klemm, and N. R. Fetter.
Atomic Absorption Newsletter, Vol 11, No 5, p 108-109, September-October 1972. 3 fig, 7 ref.

Descriptors: *Mercury, *Laboratory equipment, *Pollutant identification, *Chemical analysis, Heavy metals, Methodology, Research equipment, Water analysis.

Identifiers: *Flameless atomic absorption, *Atomic absorption spectrophotometry.

All the designs which have been proposed for a simple apparatus for the determination of mercury by a flameless atomic absorption method consist of a vessel which serves as a reduction cell and aerator, generally a drying tube to remove moisture from the air stream and an absorption cell which is positioned in the optical path of the atomic absorption spectrophotometer. In the apparatus being used by the authors compressed air is taken from the auxiliary air supply of the AA spectrophotometer and is passed to the air inlet of the flameless mercury apparatus. The aerator assembly has a 3-way stopclock and a check valve which are used to control direction of the air flow. Advantages of the system are a simplified valving arrangement in which a continuous air flow through the absorption cell is only momentarily interrupted when the valve is turned to sweep the reduced mercury out of the reduction cell, and the use of standard ball and socket joints which facilitates the rapid removal and replacement of the reduction cells on the apparatus. Each reduction cell may be easily cleaned and subsequently used either for the digestion of individual solid samples or for the addition of known quantities of water to be analyzed. The method is fast and accurate, allowing samples to be processed at the rate of at least one per minute. (Holoman-Battelle)
W73-06655

A SIMPLIFIED MICRO METHOD FOR COLLECTION AND DETERMINATION OF LEAD IN BLOOD USING A PAPER DISK-IN-DELVES CUP TECHNIQUE,
New Jersey Coll. of Medicine and Dentistry, Newark. Dept. of Preventive Medicine and Community Health.
M. M. Joselow, and J. D. Bogden.
Atomic Absorption Newsletter, Vol 11, No 5, p 99-101, September-October 1972. 3 tab, 6 ref.

Descriptors: *Lead, *Methodology, Heavy metals, Data collections, Pollutant identification.
Identifiers: *Blood, *Delves cup method, *Atomic absorption spectrophotometry, *Paper disc method, Biological samples, Precision.

A simplified procedure of using filter paper for the collection of microliter blood specimens from a finger prick, and the Delves cup atomic absorption procedure for determining the lead content of such specimens have been validated. The results obtained from lead determinations by the combined methods were comparable to those obtained by accepted macro procedures. The precision of the punched filter paper disk-Delves cup procedure was determined by analyzing 30 replicate samples. With a mean lead content of 20 micrograms/100 ml, a standard deviation of plus or minus 2 micrograms was observed. The advantages of this procedure - ease of specimen collection as well as rapidity and simplicity of the analysis (no pretreatment of the specimen required) - make this technique almost ideally suited to the needs of routine mass screening of children for lead poisoning by blood analysis. (Holoman-Battelle)
W73-06656

ARGENTIMETRIC METHOD FOR DETERMINATION OF MALATHION IN FORMULATIONS,
Public Health Service, Savannah, Ga. Technical Development Labs.
J. W. Miles, M. B. Goette, G. O. Guerrant, and F. C. Churchill, II.
Journal of the Association of Official Analytical Chemists, Vol 55, No 5, p 1133-1141, September 1972. 7 fig, 11 tab, 7 ref.

Descriptors: *Pollutant identification, *Phosphothioate pesticides, *Aqueous solutions, Methodology, Organophosphorus pesticides, Volumetric analysis, Variability, Separation techniques.
Identifiers: *Argentimetric titration, *Malathion, Chemical interference, Malaoxon, Isomalathion, Diethylmercaptosuccinate, Potentiometric titration, Sample preparation.

A method has been developed for the determination of malathion in technical grade products by argentimetric titration of the dimethylphosphorodithioate ion formed by alkaline cleavage of the molecule. Free dimethylphosphorodithioic acid and other polar impurities are removed by a column of cellulose powder containing 30 percent moisture. Malaoxon, isomalathion, and diethylmercaptosuccinate do not interfere. However, the methyl ethyl ester of malathion, if present, will titrate as malathion. The method has been adapted to the analysis of formulations of emulsifiable concentrates, water-dispersible powders, and dusting powders. The analyses can be performed potentiometrically by titration to a fixed millivoltage, using a pH meter, or with an automatic titrator operated in the derivative mode. When the method was applied to samples of technical grade malathion, the standard deviation varied from 0.21 to 0.42 percent. (Holoman-Battelle)
W73-06657

ANALYSIS OF BOTANICAL STANDARD REFERENCE MATERIALS BY CATHODE RAY POLAROGRAPHY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 02K.
W73-06658

CONFIRMATION OF PESTICIDE RESIDUE IDENTITY. II. DERIVATIVE FORMATION IN SOLID MATRIX FOR THE CONFIRMATION OF DDT, DDD, METHOXYCHLOR, PERTHANE, CIS- AND TRANS-CHLORDANE, HEPTACHLOR, AND HEPTACHLOR EPOXIDE PESTICIDE RESIDUES BY GAS CHROMATOGARPHY,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
A. S. Y. Chau, and M. Lanouette.
Journal of the Association of Official Analytical Chemists, Vol 55, No 5, p 1058-1066, September 1972. 7 fig, 4 tab, 19 ref.

Descriptors: *Pesticide residues, *Chlorinated hydrocarbon pesticides, *Pollutant identification, DDT, DDD, Heptachlor, Chemical analysis, Separation techniques, Aqueous solutions, Methodology, Gas chromatography.
Identifiers: *Electron capture gas chromatography, Methoxychlor, Perthane, cis-Chlordane, Heptachlor epoxide, Solid matrix, trans-Chlordane.

A new approach has been developed for the simultaneous confirmation of DDT-type compounds, chlordanes, heptachlor, and heptachlor epoxide. Derivatives are formed by a solid matrix derivation technique in alumina/KOH and alumina/potassium tert-butoxide. It is compared with the previously reported solution derivation technique. The high yield and simplicity of the present procedure should be useful in routine analysis, particularly for samples with a low concentration of the parent pesticide. (Byrd-Battelle)
W73-06659

INFRARED ANALYSIS OF PESTICIDE FORMULATIONS,
Virginia Dept. of Agriculture and Commerce, Richmond. Div. of Technical Services.
S. W. Goza.
Journal of the Association of Official Analytical Chemists, Vol 55, No 5, p 913-917, September 1972. 5 fig, 2 tab, 1 append.

Descriptors: *Organic pesticides, *Methodology, *Pollutant identification, Phenolic pesticides, Chlorinated hydrocarbon pesticides, Organophosphorus pesticides, Chemical analysis, Phosphothioate pesticides, Aldrin, DDT, Diazinon, Dieldrin, Endrin, Heptachlor, DDD, 2 4-D, 2 4 5-T.
Identifiers: *Infrared spectrophotometry, Infrared spectra, Esters, Guthion, Betasan, Sevin, Thrithion, Mitox, Mylone, Systox, Casoron, Phygon, Kelthane, Bidrin, Karathane, Gamma-BHC, Phosdrin, Penphene, Thimet, Delnav, Enide, Di-Syston, Zytron, Phaltan, Telodrin, Folex, Planavin, Dimecron, Dibrom, Atrazine, Azinphosmethyl, Bensulide, Captan, Carbaryl, Carbophenothion, Chlorbenside, Chlorpropham, Dacthal, Dazomet, Demeton, Dichlobenil, Dichlone, Dichlorvos, Dicofol, Dicrotophos, Dinitrobutylphenol, Dinocap, Dioxathion, Diphenamid, Disulfoton, Diuron, DMPA, Eptam, Ethion, Folpet.

The Virginia Department of Agriculture and Commerce Pesticide Formulation Laboratory has compiled infrared methods for 60 pesticides, which are distributed to other laboratories. Four basic procedures are used and standardized volumes and aliquots, when possible, are specified to simplify sample preparation. One of the standardized procedures is described in detail. (Holoman-Battelle)
W73-06660

SUSPENDED SOLIDS DETERMINATIONS USING A FILTER PHOTOMETER.

Water and Sewage Works, Ref. No. 1972, p R130-R131, August 31, 1972. 2 fig, 1 tab, 3 ref.

Descriptors: *Suspended solids, *Photometry, *Pollutant identification, *Water analysis, *Methodology, *Waste water (Pollution), Chemical analysis, Laboratory equipment, Colorimetry.
Identifiers: *Infrared colorimeter, Spectrophotometers.

The Buffalo, New York Sewer Authority has developed a fast method for determining suspended solids in waste water. A spectrophotometer was used to measure the transmittance of a sewage sample that had been blended to produce particles of a consistent size. The light source was adjusted to near the infrared range to eliminate interferences due to sample color. Comparison of the standard Gooch method with this spectrophotometric method showed a linear relationship between mg/l of suspended solids and transmittance. By drawing a graph of the relationship, it was possible to correlate the transmittance reading directly with the suspended solids concentration. This procedure requires less than five minutes and has been adapted to the Hach colorimeter. This instrument utilizes interchangeable color filters, which enable measurement of color intensities of various water constituents, and precalibrated interchangeable meter scales. Studies conducted using the colorimeter showed that sewage with suspended solids in the range of 20-300 mg/l gives the most consistent results using the infrared colorimeter. The transmittance in this range is from 40-90 percent. For sewage with higher than 300 mg/l suspended solids content, it is advantageous to dilute the sample before blending because after blending a high suspended solids sample, fibers tend to clump. The procedure to be followed in using the infrared colorimeter is outlined. (Holoman-Battelle)
W73-06661

THE PRESERVATION OF SOME OCEANIC ANIMALS FOR LIPID ANALYSIS,
National Inst. of Oceanography, Wormley (England).
R. J. Morris.
Journal of the Fisheries Research Board of Canada, Vol 29, No 9, p 1303-1307, September 1972. 3 tab, 5 ref.

Descriptors: *Chemical analysis, *Zooplankton, *Lipids, Crustaceans, Methodology, Storage, Organic compounds, Chemical degradation, Marine fish, Gas chromatography.
Identifiers: *Sample preservation, *Formalin, *Methanol, *Chloroform, Myctophum punctatum, Euphausiids, Chemical composition, Macroinvertebrates, Lanternfishes, Arthropods, Thin layer chromatography, Sterols, Esters, Phospholipids, Fatty acids, Saponification, Organic solvents.

Large samples of Meganyctiphanes norregica and Myctophum punctatum were collected, preserved by several different methods, and analyzed for fatty acid content over a period of several months in order to study the possible changes in chemical composition during storage. The methods of preservation were as follows: (1) animal lipids were extracted and stored in chloroform/methanol (2:1) under nitrogen at -30C; (2) animals were carefully dried with filter paper to remove as much surface water as possible, and then stored in specially cleaned tubes under an atmosphere of pure nitrogen at -30C; (3) animals were preserved in a 7-1/2 percent solution of formalin; (4) animals were preserved in a 10 percent solution of formalin; (5) animals were preserved in 100 percent absolute methanol. Wherever possible, analyses were carried out under an atmosphere of oxygen-free nitrogen. Saponification and determination of non-saponifiable material were carried out by standard methods. Thin-layer chromatography of the lipid extracts and preparation, hydrogenation, and gas-liquid chromatographic analyses of the methyl esters of the constituent fatty acids were carried out by methods previously described. Samples of the formalin and methanol in which the animals were preserved were also extracted and analyzed by thin-layer chromatography to ascertain whether the preservation solutions had removed any of the major lipid fractions. Deep-freezing of the material under nitrogen, after as much surface water as possible has been removed, was found to be a satisfactory method of preservation for periods of up to 9 months. Formalin and methanol methods of preservation resulted in hydrolysis of the animals's lipid and degradation of the polyunsaturated fatty acids. (Holoman-Battelle)
W73-06663

MARINE HEAVY-METAL POLLUTANT ANALYSIS BY ATOMIC ABSORPTION SPECTROMETRY,
Alaska Univ., College. Inst. of Marine Science.
D. C. Burrell.
Available from the National Technical Information Service as RLO-2229-T-1-10, $3.00 in paper copy, $0.95 in microfiche. Report No. CONF-711044-1, Contribution No. 130, October 1971. 24 p, 4 fig, 5 tab, 23 ref. Contract Nos. AEC-AT (04-3)-310 and AT (45-1)-2229.

Descriptors: Analytical techniqes, *Water analysis, *Sea water, Metals, *Heavy metals, Zinc, Mercury, Lead, Cadmium, Copper, Separation techniques, Neutron activation analysis, Reviews, Chelation, Filtration, Manganese, Iron, Cobalt, Nickel.
Identifiers: Atomic absorption, *Atomic absorption spectrophotometry, Sample preparation, Preconcentration, Precision, Shipboard analysis, Anodic stripping voltammetry, X-ray fluorescence, Detection limits, Silver.

The principal advantage of AAS analysis for trace heavy metals in the marine environment lies in the potential for an approximation to realtime data acquisition for a large number of samples. The chief problems are associated with deletions and additions of the test elements during collection, storage, and pre-analysis treatment of the samples; problems common also to non-spectrophotometric methods. The latter source of error may be largely negated in the future by the use of flame-less AAS techniques. In any case, the portability of AAS is a major advantage over neutron activation and the latest X-ray fluorescence methods. It must be emphasized that all of the commonly utilized pre-AAS analysis concentration methods for trace metals in sea water fractionate - inadvertently or otherwise - the chemical forms of the test element. It is probably preferable to preface these treatments with some oxidation step and to aim for total values, although AAS is a potentially valuable tool for looking at separated organic fractions. Neutron activation analysis is currently of comparable utility for total analysis but will be superceded when direct AAS and AFS techniques have been developed for routine shipboard use. Anodic stripping voltammetry is also very suitable for the analysis of Pb, Cd, Zn, and Cu in sea water; all of major concern as potential marine pollutants. These methods are not routine at present, but shipboard use is possible. Since it appears to be difficult to electrolytically reduce Hg in a sea water medium, an amalgamation concentration, possibly coupled with specialized long path-length absorption cells, appears to offer the most promise for marine Hg detection. The accuracy and precision data quoted for marine heavy-metal analysis relates almost exclusively to the instrumental analysis operations; the major errors lie with the sampling and other pre-analysis manipulations. (Little-Battelle)
W73-06664

SOME CHARACTERISTICS OF SEVERAL COMMERCIALLY AVAILABLE CATION-RESPONSIVE GLASS ELECTRODES,
Adelaide Univ. (Australia). Dept. of Physical and Inorganic Chemistry.
For primary bibliographic entry see Field 02K.
W73-06665

AUTOMATED DETERMINATION OF PERMANGANATE AND DICHROMATE USING A POROUS CATALYTIC OXYGEN ELECTRODE,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
B. Fleet, and A. Y. W. Ho.
Analytical Chemistry, Vol 44, No 13, p 2156-2161, November 1972. 5 fig, 4 tab, 16 ref.

Descriptors: *Automatic control, *Chemical oxygen demand, *Water analysis, *Methodology, Pollutant identification, Chemical reactions, Instrumentation, Waste water (Pollution), Salts, Cations, Dissolved oxygen analyzers, Optical properties, Ureas, Chlorides, Mercury, Oxygen demand.
Identifiers: *Permanganates, *Dichromates, *Oxygen electrode, *Coulometric oxygen analyzer, Chemical interference, Precision, Reproducibility, Ionic interference, Silver, Catalysis, Hydrogen peroxide, Permanganate method, Dichromate method.

Automated methods are described for determining permanganate and dichromate based on their reaction with hydrogen peroxide to liberate oxygen which in turn is being measured using the coulometric oxygen analyzer. An investigation of the effects of some inorganic substances (e.g., chloride ion, silver and mercuric ions) and urea on these automated procedures has also been made. Such substances may have been the normal constituents of water and waste water or they may have been added in the standard procedures to aid the digestion process and/or to remove interferences. Synthetic solutions resembling those normally found in the final titrimetric step for the standard permanganate value and the C.O.D. methods were analyzed using the present procedure. Additives which were normally used in the official standard C.O.D. method (Ag (+)) and Hg (2+) and permanganate method (phosphoric acid and urea) did not affect the analytical usefulness of the present procedure. For highly precise work, however the standards would have to be treated in an identical manner to the samples. The present procedure is not only useful as an automated finish for standard (manual) methods but can also be readily adapted to completely automated procedures for determining oxygen demand (both the permanganate value and the C.O.D.). It thus offers an attractive alternative to the existing automated permanganate and dichromate methods based on measuring the optical densities of solutions, especially when the sample is colored or turbid. (Holoman-Battelle)
W73-06666

ENZYME ELECTRODES BASED ON THE USE OF A CARBON DIOXIDE SENSOR, UREA AND L-TYROSINE ELECTRODES,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
G. G. Guilbault, and F. R. Shu.
Analytical Chemistry, Vol 44, No 13, p 2161-2166, November 1972. 5 fig, 1 tab, 12 ref.

Descriptors: *Instrumentation, *Electrical properties, Laboratory equipment, Permselective membranes, Selectivity, Physical properties, Hydrogen ion concentration, Assay, Amino acids, Stability.
Identifiers: *Enzyme electrodes, *Urea electrode, *S-Tyrosine electrode, *Potentiometry, Sensors, Substrate concentration, *Carbon dioxide electrode, Chemical interference, Acetic acid, Urease, Tyrosine decarboxylase, Reproducibility, Response time.

In an attempt to develop enzyme electrodes which are virtually free of any interference in amino acid assay, the possibility has been investigated utilizing a new sensor, the carbon dioxide electrode, for the preparation of enzyme electrodes. The electrode properties of the CO2 electrode have been evaluated. Although the response time of a CO2 electrode varies with the substrate concentration, the slopes of calibration curves agree with the Nernstian prediction i.e., 59mV/dec and 30 mV/dec for NaHCO2 and NH2Cl internal solutions, respectively. The linear concentration range is between 0.0001 and 0.1 M. Urea and L-tyrosine electrodes are prepared by coupling a layer of enzyme with a CO2 electrode. Both electrodes show properties inherited from the CO2 sensor. The selectivity of these electrodes is superb. Only acetic acid shows a slight interfering effect on electrode response from pH 5-7. (Holoman-Battelle)
W73-06667

BIOLOGICAL EFFECTS OF ATMOSPHERIC POLLUTANTS. FLUORIDES.
For primary bibliographic entry see Field 05C.
W73-06670

GAS CHROMATOGRAPHIC SEPARATION OF THE AGLYCONE METABOLITES OF CARBARYL,
Pennsylvania State Univ., University Park. Dept. of Entomology.
S. Khalifa, and R. O. Mumma.
Journal of Agricultural and Food Chemistry, Vol 20, No 3, p 632-634, May-June 1972. 2 fig, 2 tab, 22 ref.

Descriptors: *Separation techniques, Carbamate pesticides, Degradation (Decomposition), Gas chromatography.
Identifiers: *Carbaryl, *Gas liquid chromatography, *Sample preparation, Metabolites, 4-hydroxy-1-naphthyl N-methylcarbamate, 5-hydroxy-1-naphthyl N-methylcarbamate, 6-hydroxy-1-naphthyl N-methylcarbamate, 7-hydroxy-1-naphthyl N-methylcarbamate, 1-naphthyl N-hydroxymethylcarbamate, Chloromethyldimethylsilyl, Trimethylsilyl, Chloroacetyl, Trifluoroacetyl, Heptafluorobutyryl.

Trifluoroacetyl, heptafluorobutyryl, and chloroacetyl derivatives of carbaryl and various aglycone metabolities (4-hydroxy-1-naphthyl N-methylcarbamate, 5-hydroxy-1-naphthyl N-

Descriptors: *Geochemistry, *Groundwater, *Trace elements, *Metals, Copper, Lead, Zinc , Mineralogy, Carbonates, Sulfates, Sulfides, Ions, Equilibrium, Stability, Water sampling.
Identifiers: *USSR, *Bismuth, *Silver, *Supergene, Mineralization.

The behavior of Cu, Bi, Ag, Pb, and Zn was investigated in groundwater of the supergene zone of Cu-Bi deposits in Eastern Karamazar. All elements enter groundwater to some extent during the oxidation of primary ore minerals in these deposits. The concentrations of the elements decrease as the pH increases and the SO4/HC03 ratio decreases. Each element has two geochemical stages, which differ in the tendency of the element to stay in solution. The prospecting significance of each element is considered, and equilibrium concentrations and ratios to actual concentrations are calculated from thermodynamic data on the most stable migration forms and most insoluble compounds likely to occur in the supergene zone of these deposits. (Josefson-USGS)
W73-06845

CONTENT AND COMPOSITION OF AMINO ACIDS IN WATER, SUSPENDED MATTER, SEDIMENTS, AND OOZE SOLUTIONS FROM THE BLACK SEA (SODERZHANIYE I SOSTAV AMINOKISLOT V VODE, VZVESI, OSADKAKH I GRUNTOVYKH RASTVORAKH CHERNOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
N. D. Starikova, and L. I. Korzhikova.
Geokhimiya, No 2, p 230-240, February 1972. 1 fig, 3 tab, 12 ref.

Descriptors: *Geochemistry, *Amino acids, *Water, *Suspended solids, *Sediments, Aqueous solutions, Organic matter, Biochemistry, Sampling, Pore water.
Identifiers: *USSR, *Black Sea, *Oozess.

Samples of sea water, suspended matter, sediments, and pore water collected from the Black Sea in the fall of 1968 contain 14 to 16 amino acids. The content of dissolved amino acids in the sea water varies between 111 and 643 micrograms/liter (average 256), while suspended matter contains 19-91 micrograms/liter (average 33). With respect to vertical distribution, dissolved amino acids resemble those in suspended matter: concentrations are highest at 0-50 m, lower at the base of the oxidized zone (150-200 m), and higher at the bottom of the H2S zone (1,000-2,000 m). The content of amino acids in pore water varies between 1,289 and 6,003 micrograms/liter (average 3,101). The highest concentration of amino acids in pore water occurs in shallow water (56-255 m). The content of amino acids in sediments varies between 378 and 6,440 micrograms/liter of dry matter (average 1,658), with highest concentrations occurring in deep water (1,950-2,180 m). The considerable variations in amino-acid composition are caused by biochemical, physicochemical, and chemical factors, of which the biochemical factor is the most important. (Josefson-USGS)
W73-06846

NEW TECHNIQUE FOR DETERMINING THE CONCENTRATION AND DISTRIBUTION OF LEAD IN MATERIALS,
Radiological Protection Service, Sutton (England).
E. I. Hamilton.
Nature, Vol 231, No 5304, p 524-525, June 25, 1971. 1 fig, 2 tab, 7 ref.

Descriptors: *Lead, *Analytical techniques, *Irradiation, Radiochemical analysis, Pollutant identification.
Identifiers: *Biological materials, Radiation detector.

A technique was devised to study the distribution of lead in bone and biological tissues. Either thin sections or briquettes of compacted powders are irradiated with alpha particles of energy about 30 MeV. Polonium isotopes are produced from lead isotopes and the samples are set aside to allow decay of short-lived nuclides. Then the samples are covered with a thin sheet of cellulose nitrate sheet detector. Alpha particle tracks are recorded for approximately 6 weeks and after treatment of the detector, tracks appear which can be counted under a light microscope. The distribution and concentration of lead in the sample can then be determined. Advantages of the technique are no electronic instrumentation is required for detection, background events arising from alpha contamination in the detector or surroundings are very low, and track formation efficiency is high in cellulose nitrate. Comparison with a non-destructive radioactivation technique gave similar results in the 7-16 ppm range. (Eagle-Vanderbilt)
W73-06869

TRACE METAL ENRICHMENT IN THE SEA--SURFACE MICROLAYER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
S. R. Piotrowicz, B. J. Ray, G. L. Hoffman, and R. A. Duce.
Journal of Geophysical Research, Vol 77, No 27, p 5243-5254, September 1972. 3 fig, 4 tab, 17 ref. GA-20000 GX-28340.

Descriptors: *Water pollution, *Heavy metals, *Oil spills, Northeast U.S., Pollutant identification, Surface waters, Oceans, Sea water, Metals, Iron, Lead, Nickel, Copper, Sampling, Oceanography, Chemistry, Testing, Water-air interfaces, Stratification, *Rhode Island.
Identifiers: Narragansett Bay (R.I.).

Sea-surface microlayer samples have been analyzed for the trace metals aluminum, copper, iron, manganese, nickel, lead, and vanadium by atomic absorption and neutron activation. Samples were collected with polyethylene screens in the estuarine waters of Narragansett Bay, Rhode Island, the coastal waters of the New York Bight, and open ocean regions between Iceland and Nova Scotia. Metal enrichment in the 'particulate' and 'chloroform-extractable' fraction of the surface microlayer compared to water 20 cm below the surface varied from virtually none up to approximately 50 for copper, iron, and nickel and up to 20 for lead in the Narragansett Bay samples. There was no enrichment in the soluble, 'inorganic' fraction of the surface microlayer for those metals in Narragansett Bay. The degree of surface enrichment was correlated with the presence of observable slicks on the water surface. None of the New York Bight or open ocean samples were collected while observable slicks were present. Significant enrichments in particulate and chloroform-extractable phases in the surface microlayer still occurred in the majority of cases in both areas. (Jerome-Vanderbilt)
W73-06873

MERCURY: SHORT-TERM STORAGE OF NATURAL WATERS,
Naval Research Lab., Washington, D.C.
R. A. Carr, and P. E. Wilkniss.
Environmental Science and Technology, Vol 7, No 1, p 62-63, January 1973. 2 fig, 8 ref.

Descriptors: *Sampling, *Storage, *Mercury, Water analysis, Chemical analysis, Laboratory tests, Reliability, Stability, Analytical techniques, Tracers, *Chesapeake Bay, Estuarine environment, Evaporation, *Pollutant identification.

Analysis of natural waters for mercury requires an understanding of changes occurring during storage, such as losses to container walls, association with particulate phases, and vaporization. Use of carrier-free Hg (197) and improved flameless atomic absorption techniques show negligible losses to sample containers upon 8-day storage at pH 1. At the time of sampling, 80% of the total mercury was associated with particulates, while at the end of the storage period only 10-15% was associated with particulates. No vaporization losses were observed under these conditions. (Jerome-Vanderbilt)
W73-06874

LEAD AND MERCURY BURDEN OF URBAN WOODY PLANTS,
Yale Univ., New Haven, Conn. School of Forestry.
W. H. Smith.
Science, Vol 176, No 4040, p 1237-1239, June 16, 1972. 1 tab, 22 ref.

Descriptors: *Lead, *Mercury, *Trees, Heavy metals, Geology, Air pollution, Trace elements, Path of pollutants, Plant tissues, Environmental effects, *Connecticut, Cities.
Identifiers: Automobile exhausts, *New Haven (Conn).

For six New Haven woody plant species, the mean lead concentrations for tissue produced in the preceding growing season exceeded most lead concentrations determined for trees in areas with geologic lead deposits or adjacent to primary highways. Preliminary estimates indicate that some New Haven plants have slightly higher than natural amounts of mercury. The burden of lead and the difficulty in removing it by washing suggest a potential for pathological significance. (Oleszkiewicz-Vanderbilt)
W73-06876

ASSOCIATION CONSTANTS OF METHYMERCURY WITH SULFHYDRYL AND OTHER BASES,
National Inst. of Arthritis and Metabolic Diseases, Bethesda, Md.
R. B. Simpson.
Journal of the American Chemical Society, Vol 83, p 4711-4717, December 5, 1961. 1 fig, 4 tab, 19 ref.

Descriptors: *Mercury, *Chemical reactions, Ionization, Proteins, Equilibrium, Analytical techniques, Pollutant identification.
Identifiers: *Methylmercury, Organomercuric compounds, Association constants, Affinity, Equilibrium constants, *Sulfhydryl.

The distribution constants of methylmercuric halides between water and toluene were measured. The association constants of methylmercuric ion with various (Bronsted) bases, including those common in proteins, were measured and found to be in general much smaller than the association constants of mercuric ion with these bases. The greatest difference found was for the sulfhydryl group of cysteine or glutathione. Certain discrepancies suggested a recalculation of the equilibrium in the reaction of a bifunctional organic mercurial (XHgR'HgX) with the single sulfhydryl groups of two human serum mercaptalbumin (HSA) molecules to form a dimer (ASHgR'HgSA). If the affinity of cyanide for ASHgR'Hg (+) is taken equal to that of cyanide for CH3Hg (+), instead of for mercury, a recalculation of the effect of cyanide on the dissociation of the dimer changes the rough estimate of the equilibrium constant (ASHgR'HgSA) / (ASHgR'Hg (+)) (AS (-)) from 10 to the power 18.2 to about 10 to the power 14.9. On the basis of the affinity of CH3Hg (+) for Cl (-) and Br (-) the equilibrium constant for the mercury dimer of human mercaptalbumin is similarly revised lower. (Oleszkiewicz-Vanderbilt)
W73-06877

HYPERFINE ZEEMAN EFFECT ATOMIC ABSORPTION SPECTROMETER FOR MERCURY,
California Univ., Berkeley. Lawrence Radiation Lab.
T. Hadeishi, and R. D. McLaughlin.
Science, Vol 174, No 4007, p 404-407, October 22, 1971. 3 fig, 7 ref.

Descriptors: *Mercury, *Spectrophotometry, *Trace elements, Analytical techniques, Laboratory equipment, Testing, Absorption, Pollutant identification.
Identifiers: *Atomic absorption spectroscopy, Transmission.

A new type of atomic absorption spectrometer - one that detects trace mercury in host material, based on hyperfine structure lines in a magnetic field - was developed and tested on various substances. This device can detect trace mercury to about 0.04 part per million (40 parts per billion) in about 1 minute. No chemical separation from the host material is necessary. A portable commercial-type unit is envisioned which would be inexpensive and simple to use in the field. The sample is combusted to convert all of the mercury compounds in it to metallic mercury. Non-mercury elements which either scatter or absorb the 2537A radiation are corrected for by detecting the difference between the total monitoring light and the reference light. (Oleszkiewicz-Vanderbilt)
W73-06879

MERCURY VAPOR CONCENTRATIONS INSIDE BUILDINGS,
GeoSensors Inc., Dallas, Tex.
R. T. Foote.
Science, Vol 177, No 4048, p 513-514, August 11, 1972. 1 tab, 4 ref.

Descriptors: *Mercury, *Paints, Vapor pressure, Environment, Environmental sanitation, Path of pollutants, Pollutant identification, Heavy metals, *Air pollution.
Identifiers: *Dallas (Tex), *San Francisco, *Washington D.C., Atomic absorption spectroscopy.

The concentrations of elemental gaseous mercury in several homes, offices, and laboratories in the Dallas area have been measured by atomic absorption spectroscopy. The values are substantially higher than the ambient natural background concentration, about 3 nanograms of mercury per cubic meter of air in San Francisco, Dallas, and Washington, D.C. Mercury concentration in the atmosphere of homes and offices is dependent upon the type of paint used and length of time that has elapsed since the rooms were painted. (Oleszkiewicz-Vanderbilt)
W73-06880

MERCURY CONTENT OF COMMON FOODS DETERMINED BY NEUTRON ACTIVATION ANALYSIS,
Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.
J. T. Tanner, M. H. Friedman, D. N. Lincoln, L. A. Ford, and M. Jaffee.
Science, Vol 177, No 4054, p 1102-1103, September 22, 1972. 2 tab, 12 ref.

Descriptors: *Mercury, *Foods, *Neutron activation analysis, Chromatography, Analytical techniques, Laboratory tests, Sampling, Milk, Potatoes, Shrimp, Heavy metals, Environmental effects, Pollutant identification.
Identifiers: Mercury pollution.

The mercury contents in samples of flour, sugar, nonfat dry milk, potatoes, hamburger, chicken breast, shrimp, liver, eggs, and whole milk were determined by neutron activation analysis. The mercury was separated by anion exchange chromatography and precipitated as the sulfide. The mercury concentrations for all these foods were below 50 parts per billion. (Oleszkiewicz-Vanderbilt)
W73-06881

MAGNESIUM-IRON REPLACEMENT IN CLAY MINERALS IN ANOXIC MARINE SEDIMENTS,
Scripps Institution of Oceanography, La Jolla, Calif.
J. J. Drever.
Science, Vol 172, No 3990, p 1334-1336, June 25, 1971. 3 fig, 12 ref.

Descriptors: *Metals, *Magnesium, *Iron, *Clay minerals, Marine geology, Sediments, Sea water, Chemical reaction, Path of pollutants, Water pollution, Ion exchange.
Identifiers: *Anoxic marine sediments.

In recent marine sediments from Banderas Bay, Mexico and from the Deep Sea Drilling Project magnesium depletion occurs in reducing terrigenous sediments. The depletion is related to sulfate reduction rather than to pH or SiO2 concentration. It appears that in anoxic marine sediments iron is extracted from clay minerals to form a sulfide. Magnesium from the surrounding solution then replaces the extracted iron in the clay mineral structure. This process removes magnesium from seawater and serves as a control on the composition of interstitial waters in sediments. Physical chemistry of the processes occurring is illustrated. (Oleszkiewicz-Vanderbilt)
W73-06885

MERCURY IN NORTH-EASTERN ATLANTIC OCEAN WATER,
Southampton Univ. (England). Dept. of Oceanography.
T. M. Leatherland, J. D. Burton, M. J. McCartney, and F. Culkin.
Nature, Vol 232, No 5306, p 112, July 9, 1971. 1 tab, 5 ref.

Descriptors: *Sea water, *Atlantic Ocean, *Mercury, Water pollution sources, Sampling, On-site data collections, Laboratory tests, Water analysis, Heavy metals, Distribution, Pollutant identification.

An analysis was made of water taken from the Northeastern Atlantic Ocean during February and March of 1971, in order to ascertain the mercury distribution. Both surface and subsurface samples were taken. The concentrations of the four surface samples ranged from 0.013 to 0.018 micrograms/l. Three subsurface samples contained similar concentrations while two others contained much lower concentrations. It is felt that more information on the distribution of mercury in sea water is needed. (Jerome-Vanderbilt)
W73-06889

CARTESIAN DIVER MICRORESPIROMETRY FOR AQUATIC ANIMALS,
Polish Academy of Sciences, Warsaw. Inst. of Experimental Biology.
For primary bibliographic entry see Field 07B.
W73-06913

COMPARISON OF OXYGEN-BOMB COMBUSTION WITH STANDARD IGNITION TECHNIQUES FOR DETERMINING TOTAL ASH,
Dartmouth Coll., Hanover, N.H. Dept. of Biological Sciences.
W. A. Reiners, L. K. Malinin, and V. V. Gaiduk.
Ecology, Vol 53, No 1, p 132-136, Winter 1972. 2 fig, 2 tab, 14 ref.

Descriptors: *Chemical analysis, *Methodology, *Biomass, *Soil analysis, *Productivity, *Plant tissues, Nitrogen, Sampling, Temperature, Sieves, Pollutant identification, Standing crops, Bark, Leaves, Root systems.
Identifiers: *Oxygen-bomb combustion, *Muffle-furnace technique, *Dry ashing, Char method, Sample preparation, Calorimetry, Precision, Errors.

Ash was determined in a variety of plant and organic soil samples by oxygen-bomb combustion and by a simple muffle-furnace technique. The influence of using different drying temperatures was also assessed. One hundred thirty-nine plant tissue and 15 organic soil samples were collected and analyzed by oxygen-bomb combustion, muffle-furnace, char, and calorimetric techniques. Bomb combustion produced a systematic error of underestimate and a random error of variation between trials. These errors varied among the different types of material tested, but in general both types of error increased with the ash content of the material. The average systematic error of underestimate of ash content for all samples was 1.46 percent, which led to an error of 1.56 percent when adjusting caloric coefficients to an ash-free basis. Lower drying temperatures had an insignificant effect on adjusted caloric coefficients. Independent ash determinations are recommended for materials with ash content greater than 5 percent to restrict the error of adjusted coefficients below 1 percent. The muffle-furnace technique is recommended for close approximations of absolute ash content. (Byrd-Battelle)
W73-06929

WATER POLLUTION POTENTIAL OF SNOWFALL ON SPENT OIL SHALE RESIDUES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-06934

PYROLYTIC GRAPHITE-TUBE MICRO-FURNACE FOR TRACE ANALYSIS BY ATOMIC ABSORPTION SPECTROMETRY,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
K. I. Aspila, C. L. Chakrabarti, and M. P. Bratzel, Jr.
Analytical Chemistry, Vol 44, No 9, p 1718-1720, August 1972. 3 fig, 12 ref.

Descriptors: *Aqueous solutions, *Gold, *Trace elements, Instrumentation, Equipment, Laboratory equipment, Separation techniques, Solvent extractions.
Identifiers: Atomic absorption spectrophotometry, *Graphite tube furnace, Preconcentration, Sample preparation, Calibration curves, Atomizers, Gold chloride.

A preliminary study has demonstrated the potentialities of a simple pyrolytic graphite tube furnace as a nonflame atomization device for use in trace analysis by atomic absorption spectrometry. Aqueous samples can be analyzed satisfactorily and reproducible absorption signals obtained. Gold in either MIBK or dilute acid yields the same sensitivity. Since aqueous samples can be analyzed directly without pretreatment of the rod, the sensitivity should be independent of the solvent employed. The higher cost of pyrolytic graphite would be offset by the increased lifetime of the furnace. Several modifications of this prototype furnace are suggested to improve the sensitivity, precision, and ease of use. The use of more sophisticated electronic circuitry for temperature-programmed preheating and atomization is suggested so as to increase the rate of rise in temperature, to maintain the constancy of this rate, and to increase the maximum temperature attainable. The division of the preheating step into two distinct steps would permit selective drying to remove the solvent, followed by ashing of the sample to remove any matrix that is volatile or rendered volatile by combustion, such as organic

materials. Other suggested modifications are included. (LittletBattelle)
W73-06938

DETERMINATION AND PREDICTION OF ANOMALOUS RESPONSE FACTORS FOR HALOGENATED SUBSTANCES WITH THE THERMAL CONDUCTIVITY DETECTOR,
Rhode Island Univ., Kingston. Dept. of Chemistry.
E. F. Barry, R. S. Fischer, and D. M. Rosie.
Analytical Chemistry, Vol 44, No 9, p 1559-1562, August 1972. 7 tab, 19 ref.

Descriptors: *Gas chromatography, *Equations, *Organic compounds.
Identifiers: *Relative molar response, Thermal conductivity detector, Chlorinated hydrocarbons, Chlorobutane, Chloromethylpropanes, Chloropentane, Chlorohexane, Chloroheptane, Bromoethane, Bromopropane, Bromobutane, Bromomethylpropane, Bromopentane, Iodomethane, Iodoethane, Iodopropane, Iodobutane, Iodopentane, Methylene chloride, Chloroform, Carbon tetrachloride, Dibromomethane, Bromochloromethane, Dibromoethane, Bromochloroethane, Dichloroethane, Dichloroethylene, Dichloropropene, Trichloroethylene, Fluorobenzene, Fluorotoluene, Chlorofluorobenzene, Chlorobenzene, Chlorotulene, Benzene.

The recorded peak area arising from an eluted solute in a thermal conductivity detector is a function of the molecular properties of the solute and carrier gas. In this study, signal strengths were determined in the form of relative molar response (RMR) factors for nearly 40 halogenated hydrocarbons. These substances exhibit substantially different responses compared to other classes of compounds. The RMR data have also been predicted through the molecular diameter approach suggested by Littlewood. The RMR equation can adequately describe the trends in the experimental RMR data. The anomalous response of the halogenates can be explained by their molecular diameters which are comparable with analogous hydrocarbons. (Little-Battelle)
W73-06939

ESTIMATION OF FE (III) SPECTROPHOTOMETRICALLY BY 7-NITRO-8-QUINOLINOL-5-SULPHONIC ACID,
Gujarat Univ., Ahmedabad (India). University School of Sciences.
S. K. Patel, K. P. Soni, and I. M. Bhatt.
Laboratory Practice, Vol 21, No 5, p 337-339, May 1972. 3 fig, 3 tab, 19 ref.

Descriptors: *Spectrophotometry, *Iron, Aqueous solutions.
Identifiers: *Chemical interference, *Absorbance, *7-nitro-8-quinolinol-5-sulphonic acid.

Stock solutions of 0.05 N Fe (III) were prepared in 0.01 M and 0.1 M H2SO4 and requisite amounts mixed with 20 ml of 0.05 M NQSA (7-nitro-8-quinolinol-5-sulphonic acid) solution for colorimetric analysis. Solutions were adjusted to pH 3.0 with NaOH and absorbance measurements were made at 550 nm. Solutions were also prepared containing Ag, Al, Ba, Ca, Ce, Cd, Hg, Mg, Mn, Pb, Th, Zn, acetate, borate, citrate, cyanide, and fluoride to study the effect of interfering anions and cations. Cuvettes with 0.5-, 1.0-, and 4.0-cm optical path lengths were also prepared to study the validity of Beer's law over a wide range of concentrations. The studies showed that the molar extinction coefficient of the Fe (III) complex is 4900 at 550 nm. The sensitivity of the color reaction is 0.01 microgram Fe (III) per cc. The sensitivity is comparable to that of ferron, mercaptoacetic acid, salicylic acid, salicyladoximine. Sodium and ammonium ions do not interfere. Potassium in a concentration greater than 0.2 M results in precipitation of the potassium salt of the reagent. Although cobalt, nickel, and chromium produce a slight coloration, Fe (III) may be determined in the presence of comparatively small quantities of these cations. Chloride, bromide, iodide, sulphate, nitrate, and perchlorate ions do not interfere. On the other hand, oxalate, phosphate, tartrate, citrate, fluoride, cyanide, and borate interfere but their tolerance limit is very low. One advantage of the reagent NQSA is its applicability at a high acidity. Beer's law was obeyed for concentration ranges of 0.2 to 35 ppm. (Little-Battelle)
W73-06940

LIQUID SCINTILLIATION COUNTING: SAMPLE PREPARATION TECHNIQUES FOR ORGANIC MATERIALS,
Nuclear Enterprises Ltd., Edinburgh (Scotland).
D. R. Nicoll, and M. J. C. Ewer.
Laboratory Practice, Vol 21, No 3, p 174-176, March 1972. 3 fig, 3 tab.

Descriptors: *Organic compounds, *Methodology, Pollutant identification, Aqueous solutions, Proteins, Solubility, Alcohols, Tritium, Efficiencies.
Identifiers: *Sample preparation, *Liquid scintillation, *Scintillation counting, *Chemical digestion, *Combustion, *Wet oxidation, Tissue, Blood, Organic solvents, Biological materials, Biological samples.

Methods of incorporating organic samples into liquid scintillators are reviewed. Recommendations are made for samples soluble in aromatic solvents or in alcohols, aqueous samples, tissues, proteins, whole blood, insoluble materials, and so forth. Advantages and disadvantages of spectrum shifters are detailed, and pitfalls producing inaccurate results are given. (Holoman-Battelle)
W73-06943

NITRATE ION SELECTIVE ELECTRODES BASED ON POLY (VINYL CHLORIDE) MATRIX MEMBRANES,
University of Wales Inst. of Science and Tech., Cardiff.
L. E. W. Davies, G. J. Moody, and J. D. R. Thomas.
Analyst, Vol 97, No 1151, p 87-94, February 1972. 4 fig, 2 tab, 35 ref.

Descriptors: Performance, *Fabrication, *Nitrates, *Aqueous solutions, *Laboratory equipment, Permselective membranes, Heavy metals, Membrane processes, Specifications, Ion exchange, Calibrations, Radioactivity effects, Hydrogen ion concentration, Cations, Anions, Zeta potential, Physical properties, Instrumentation, Cobalt radioisotopes, Fluorides, Chlorides, Bromides, Iodides, Nitrites, Sulfates, Carbonates, Bicarbonates, Phosphates, Copper.
Identifiers: *Ion selective electrodes, *Nitrate selective electrodes, Membrane electrodes, Selectivity coefficients, Detection limits, Response time, Chemical interference, Ionic interference, Sensors, Acetates, Chlorates, Perchlorates, Cyanides, Hydrogen phosphates, Dihydrogen phosphates, Ammonium ions, Lanthanum.

The fabrication and general performance are described of two nitrate-selective electrodes based on nitrate liquid ion exchangers incorporated in a poly (vinyl chloride) matrix. The two electrodes are the Corning 477316 and the Orion 92-07-02 liquid ion exchangers. The general performmances of both PVC (Corning exchanger) and (Orion exchanger) electrodes compared favorably with their commercial counterparts. The recommended amounts of Orion 92-07-02 or Corning 477316 exchanger for re-charging the respective electrodes, namely 0.4 ml, is also sufficient to cast a master PVC membrane. Several fresh electrodes can be prepared from the master membrane as required and, if desired, the active disc from the master membrane can be sealed to the original rigid PVC electrode body to provide a new fully functional PVC membrane electrode. This represents a considerable cost saving on ion exchanger alone, and the long lifetime of the PVC (Corning exchanger) electrode is a notable feature. The selectivity coefficients for the seven anions tested for interference were essentially identical for both PVC-nitrate electrodes, which suggests a close chemical similarity between the proprietary Orion and Corning liquid ion exchangers. However, there are differences and thin-layer chromatography on silica gel G with benzene-toluene (1 plus 1 v/v) gave an R sub f value of about 0.02 for the Orion exchanger non-volatile constituent compared with 0.65 for that of the Corning exchanger. (Holoman-Battelle)
W73-06944

PB-210—RA-226: RADIOACTIVE DISEQUILIBRIUM IN THE DEEP SEA,
Scripps Institution of Oceanography, La Jolla, Calif.
H. Craig, S. Krishnaswami, and B. L. K. Somayajulu.
Earth and Planetary Science Letters, Vol 17, No 2, p 295-305, January 1973. 2 fig, 3 tab, 21 ref.

Descriptors: *Lead radioisotopes, *Radium radioisotopes, *Sea water, *Water chemistry, *Equilibrium, Ion transport, Ion exchange, Adsorption, Sedimentation, Chemical precipitation.

Pb-210 and Ra-226 were measured in the North Atlantic and North Pacific deep water. The Pb-210 activity is 25% to 80% of that of Ra-226, averages about 50% in each profile, and is lowest in the bottom water. This deficiency of Pb-210 relative to Ra-226 shows that Pb-210 is rapidly and continually scavenged from deep water, probably by adsorption on particulate material sinking from the surface. A method was developed for simultaneous application of the vertical diffusion-advection model to Ra-226 and Pb-210 deep-water profiles, and the in-situ source terms for both isotopes were obtained as a function of the parametric upwelling velocity. For a positive source term for Ra-226 on in deep water, the parametric velocity is limited to a small range (3-12 m/y) and the deep-Pacific residence of lead is 54 yr, a value two orders of magnitude smaller than residence times estimated from stable lead concentrations. The model calculations show that an in-situ scavenging process, acting throughout the water column is required to remove the Pb. Box model calculations yield a similar short residence time for lead in North Atlantic deep water, indicating that radioactive disequilibrium for Pb-210 due to fast scavenging, is a general phenomenon through the deep sea. (Knapp-USGS)
W73-06962

SPECTROPHOTOMETRIC DETERMINATION OF CHROMIUM WITH XYLENOL ORANGE AND METHYLTHYMOL BLUE,
Missouri Univ., Kansas City. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W73-07028

FRESHWATER FERROMANGANESE CONCRETIONS: CHEMISTRY AND INTERNAL STRUCTURE,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 02H.
W73-07054

WATER QUALITY EVALUATION PHYSICAL AND CHEMICAL,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 05B.
W73-07061

TERTIARY TREATMENT BY LIME ADDITION AT SANTEE, CALIFORNIA,
Santee County Water District, Calif.
For primary bibliographic entry see Field 05D.
W73-07062

SPECTROPHOTOMETRIC DETERMINATION OF PHOSPHORUS IN BIOLOGICAL SAMPLES AFTER DRY ASHING WITHOUT FIXATIVES,
Research Inst. for Animal Nutrition, Pohorelice (Czechoslovakia).
J. Tusl.
Analyst, Vol 97, No 1151, p 111-113, February 1972. 1 tab, 9 ref.

Descriptors: *Spectrophotometry, *Phosphorus, *Chemical analysis, *Methodology, *Pollutant identification, Barley, Wheat, Grains (Crops), Sugar beets, Gravimetric analysis, Cotton, Reliability, Metals.
Identifiers: *Dry ashing, *Biological samples, *Sample preservation, Sample preparation, Solids, Molybdovanadate method, Reduced molybdophosphate method, Bone meal, Chemical digestion, Fish meal, Groundnut, Lucerne meal, Chemical recovery, Sample storage, Precision.

Simple dry ashing of samples without the use of fixatives can be used in the determination of phosphorus, in addition to metals, in biological materials. The application of fixatives or the use of more tedious wet digestions can therefore be avoided. For the final determination of phosphorus, two alternative spectrophotometric procedures can be used: either the accurate molybdovanadate method for wider ranges of phosphorus concentration, with which the reagent can be stored for about 6 months, or the reduced molybdophosphate method, which should be applied when rapid determination of very small amounts of phosphorus is required. (Holoman-Battelle)
W73-07065

THE DISTRIBUTION OF DISSOLVED ORGANIC MATTER IN THE NEAR-SHORE WATERS OF THE TEXAS COAST,
Texas Univ., Port Aransas. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W73-07066

OCCURRENCE AND TYPES OF THIOBACILLUS-LIKE BACTERIA IN THE SEA,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05B.
W73-07067

SURFACE CONCENTRATION OF MARINE BACTERIA,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 05B.
W73-07070

ECOLOGICAL-GEOGRAPHICAL REGULARITIES OF HETEROTROPHIC BACTERIA DISTRIBUTION IN THE EQUATORIAL-TROPICAL ZONE OF THE WORLD OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
A. E. Kriss, I. E. Mishustina, I. N. Mitskevitch, M. I. Novozhilove, and T. P. Stupakova.
Internationale Revue der Gesamten Hydrobiologie, Vol 56, No 5, p 689-730, 1971. 29 fig, 11 tab, 16 ref.

Descriptors: *Marine bacteria, *Ecological distribution, Atlantic Ocean, Pacific Ocean, Water sampling, Indian Ocean, Sea water, Cultures, Physicochemical properties, Hydrogen ion concentration, Nitrates, Nitrites, Phosphates, Organic matter, On-site data collections, Mud.
Identifiers: *Heterotrophic bacteria, *Bacterial populations, Vertical distribution, Membrane filters, Nansen bathometer, Culture media, Growth media.

The quantitative distribution of heterotrophic microorganisms is determined by the distribution of unstable organic matter. Autochthonous organic matter in the equatorial-tropical region of the World Ocean is supplemented by considerable quantities of organic matter introduced by continental and insular discharge from land. Copious rivers in this region of the World Ocean introduce unstable organic matter into the water in such amounts that, together with autochthonous organic matter, they exceed the concentration of unstable organic matter elsewhere in the World Ocean. Microbiological research was conducted to compare the density of microbial population (heterotrophs) from the various areas of the equatorial-tropical zone. Water sampling was carried out at varying depths and near the ocean floor using a Nansen bathometer. The samples were immediately analyzed by growing the microorganisms on membrane ultrafilters placed face up on nutrient agar in Petri dishes. After 3 to 5 days of incubation at 23-28 degrees, the colonies grown on the filter were counted and representatives from nonuniform colonies were inoculated onto slants of nutrient agar. Mud samples were collected with a grab or a uniflow pipe. Immediately after collecting the surface layer of mud (0-2 cm) it was inoculated in dilutions of 0.1, 0.01, 0.001, 0.0001, 0.00001, 0.000001 on meat peptone broth prepared with seawater, while mud samples of 0.1 ml in dilutions of 0.1, 0.001 were deposited on the nutrient agar in Petri dishes and kneaded with a spatula, or else, 1 ml was poured into Petri dishes and mixed with molten nutrient agar after cooling it to 45C. After 2-4 days of temperature incubation at 23-28C, the titer of heterotrophic bacteria grown on meat-peptone broth was determined and the number of colonies on nutrient agar counted. The density of microbial population (heterotrophs) was lowest in the western part of the Indian Ocean. There was a considerable difference in the content of heterotrophic bacteria in the southern equatorial zone of the Indian and Atlantic Oceans near Africa. The percentage of water samples rather high in heterotrophs in the Atlantic was twice as high as in the Indian Ocean. As to muds, there was no relation between the depth of the ocean and the content of heterotrophic bacteria in the water. (Holoman-Battelle)
W73-07071

GROWTH OF YEASTS ON HYDROCARBONS AT 37 DEGREES,
Regional Research Lab., Jorhat (India).
For primary bibliographic entry see Field 05B.
W73-07075

SAPROBIC SEQUENCE WITHIN THE GENUS VORTICELLA,
Vysoka Skola Chemicko-Technologicka, Prague (Czechoslovakia).
For primary bibliographic entry see Field 05B.
W73-07078

ANOMALOUS FLUORESCENCE AND EXCITED STATE PROTOLYSIS OF 8-MERCAPTOQUINOLINE,
Florida Univ., Gainesville. Coll. of Pharmacy.
S. G. Schulman.
Analytical Chemistry, Vol 44, No 2, p 400-402, February 1972. 1 fig, 1 tab, 12 ref.

Descriptors: *Chemical properties, *Fluorescence, Organic compounds, Chelation, Organic acids, Solvents, Hydroxides, Alcohols, Chemical analysis, Analytical techniques, Chemistry, Spectroscopy.
Identifiers: *8-Mercaptoquinone, Fluorescence spectra, *Atomic absorption spectrophotometry, Emission spectra, 8-Hydroxyquinone, Zwitterions, Mercaptans, Thiomethylquinoline, Polarized extraction spectra, Quinones, Atomic absorption.

Fluorescence, protolysis and absorption spectroscopy have been used to analyze 8-mercaptoquinoline, providing for its characterization and comparison to 8-hydroxyquinoline. Chemical analysis indicates that the fundamental difference between 8-mercapto- and 8-hydroxyquinoline lies in the availability of vacant 3d orbitals on the sulfur atom, which can accept an electronic charge from the aromatic pi-system of the quinoline ring. Emission and adsorption spectra show that the long wavelength absorption maximum of 8-mercaptoquinolinium cations lies slightly to the red of that for the 8-quinolinolium cation, and that the pK sub a for the cation-zwitterion equilibrium of 8-mercaptquinoline is lower than that of 8-hydroxyquinoline. (Mackan-Battelle)
W73-07079

REPORT ON OILS AND FATS,
Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.
D. Firestone.
Journal of the Association of Official Analytical Chemists, Vol 55, No 2, p 270-271, March 1972. 1 tab, 3 ref.

Descriptors: *Analytical techniques, *Oil, Chemical analysis, Fatty acids, Gas chromatography, Chromatography, Spectrophotometry.
Identifiers: Vegetable oils, Peanut oil, Corn oil, Cottonseed oil, Soybean oil.

Brief reports are given on AOAC work on the analysis of oils and fats. Methods include chromatography and spectrophotometry. One particular study showed that sterol ratios of corn, cottonseed, soybean, and peanut oils could be used to identify individual oils. (Snyder-Battelle)
W73-07080

NONDESTRUCTIVE CHARGED PARTICLE ACTIVATION ANALYSIS USING SHORT-LIVED NUCLIDES,
Texas A and M Univ., College Station. Dept. of Chemistry.
J-L. Debrun, D. C. Riddle, and E. A. Schweikert.
Analytical Chemistry, Vol. 44, No. 8, p 1386-1391, July 1972. 5 fig, 7 tab, 12 ref.

Descriptors: *Analytical techniques, *Radioactivity techniques, Radioisotopes.
Identifiers: Selenium, Bromine, Yttrium, Zirconium, Lanthanum, Praseodymium, Dysprosium, Neodymium, *Proton activation analysis, Chemical interference.

The objective was to combine the features of nondestructive determination with speed of analysis. Accordingly, this study was restricted to radioisotopes with half-lives ranging from 1 second to approximately 1 minute. Furthermore, only those species were considered which emit one or several gamma-rays besides the 511 keV annihilation peak. Thirty elements were irradiated with protons or tritium particles. Activation with tritium proved to be of little interest in the cases studied. Proton activation was found suitable for the trace determination of the following elements: Se, Br, Y, Zr, La, Pr, Dy, and Nd. Data on their respective specific activities, activation curves, and pertinent gamma-ray energies (plus or minus 0.3 keV) are given. These elements can be determined in 13 matrix elements which yield little or no activity under the experimental conditions described. Among these are matrices where neutron activation analysis cannot be applied easily because of high neutron absorption or activation cross sections. (Little-Battelle)
W73-07084

INFLUENCE OF SOLVENT MATRIX UPON PHOSPHORESCENCE SIGNALS,
Florida Univ., Gainesville. Dept. of Chemistry.
R. J. Lukasiewicz, J. J. Mousa, and J. D. Winefordner.
Analytical Chemistry, Vol 44, No 6, p 963-966, May 1972. 3 fig, 1 tab, 19 ref.

Descriptors: *Aqueous solutions, *Solvents, *Salts, Chemical analysis, Pollutant identification, Sodium chloride, Temperature.
Identifiers: *Phosphorescence, *Chemical interference, *Matrix effects, Sodium iodide, Phosphorimetry, Sodium bromide.

The influence of methanol-water mixtures and of sodium chloride, sodium bromide, and sodium iodide aqueous solutions of several organic molecules at 77 K upon phosphorescence signals is studied using a modified spectrofluorometer. Only a few percent by weight of methanol in water, sodium iodide in a methanol-water mixture, and sodium chloride, sodium bromide, or sodium iodide in water resulted in phosphorescence signals at 77 K several orders of magnitude greater than the phosphorescence signal for the same analyte in pure water solution. The salt solutions at 77 K resulted in even larger phosphorescence signals from the methanolic solutions due to the additional effect of the heavy atom (iodide being the most effective of the three halides). The optimum aqueous solvent for routine analytical phosphorimetric measurements appears to be a 5-30 percent aqueous solution of sodium iodide. All studies are carried out with an open rotating quartz capillary cell. (Byrd-Battelle)
W73-07091

ANALYTICAL APPLICATIONS OF ION--MOLECULAR REACTIONS. IDENTIFICATION OF C5H10 ISOMERS BY ION CYCLOTRON RESONANCE SPECTROMETRY,
Nebraska Univ., Lincoln. Dept. of Chemistry.
M. L. Gross, P. H. Lin, and S. J. Franklin.
Nebraska Univ., Lincoln. Dept. of Chemistry.

Descriptors: *Chemical analysis, *Pollutant identification, Kinetics, Mass spectrometry, Chemical reactions, Organic compo ods, Cation exchange.
Identifiers: *Pentene, *Ion cyclotron resonance spectrometry, 1 3-butadiene, Cyclopentane, 2-methyl-2-butene, Mass spectra, Olefins, Aliphatic hydrocarbons.

Pentene isomers can be identified using an ion cyclotron resonance spectrometric (ICR) method at relatively low pressure and at low ion kinetic energies. Molecular 1,3-butadiene cation and various neutral C5H10 isomer samples were prepared on a vacuum line and degassed thoroughly prior to being analyzed with an ICR spectrometer. The results obtained were compared with conventional mass spectra determined with a mass spectrometer. The 1,3-butadiene radical cation produced at 10.9 eV reacts with 1-pentene, 3-methyl-1-butene, 2-methyl-1-butene, and cis- and trans-2-pentent to produce C8H13 (plus), C7H12. (plus), C7H11 (plus), C6H10. (plus), and C6H9 (plus). Significant quantitative differences in the ion-molecule chemistry allow each isomer to be distinguished. The other isomeric pentene, 2-methyl-2-butene, undergoes only a charge exchange reaction with the butadiene radical cation. The final C5H10 studies, cyclopentane, is totally inert toward the butadiene radical cation. The results indicate that ion-molecule reactions studied by ICR may prove to be an important complement to conventional mass spectrometry for such difficult analyses. (Byrd-Battelle)
W73-07092

INVESTIGATION INTO THE MECHANISM OF DESOLVATION OF SAMPLE DROPLETS IN FLAME SPECTROMETRY,
Indiana Univ., Bloomington. Dept. of Chemistry.
N. C. Clampitt, and G. M. Hieftje.
Analytical Chemistry, Vol 44, No 7, p 1211-1220, June 1972. 6 fig, 3 tab, 42 ref.

Descriptors: *Flame photometry, *Drops (Fluids), *Pollutant identification, Solvents, Heat transfer, Evaporation, Statistical methods, Model studies, Alcohols, Chemical analysis, Evaporation control, Analytical techniques.
Identifiers: *Flame spectrometry, *Desolvation, Flame emission spectroscopy, Fluorescence spectrophotometry, Absorption spectrophotometry, Methanol, Ethanol, Isopropanol, Carbon tetrachloride, Cyclohexane.

A discrete droplet generator is used to measure the rates of desolvation of isolated droplets of water, methanol, ethanol, isopropanol, carbon tetrachloride, and cyclohexane in an air-acetylene flame. A comparison of the measured rates to those predicted by existing theories indicates that droplet desolvation in an analytical flame is a thermally controlled process, which depends on the thermal properties and composition both of the droplet and of the flame gases. Through use of statistical thermodynamic considerations, it is shown that the necessary parameters can be calculated for use in predicting droplet desolvation rates under specific conditions. A model is developed for such predictions in order to optimally characterize this experimental variable and thereby increase the precision of spectrometric analysis where desolvation has a large effect on quantitative results. Errors in the model and calculations are considered along with applications to desolvation in analytical flames, spray chamber and other thermal sources. (Mackan-Battelle)
W73-07093

USE OF MULTIVARIATE ANALYSIS TO IDENTIFY FUNCTIONAL COMPONENTS OF THE BENTHOS IN ST. MARGARET'S BAY, NOVA SCOTIA,
Bedford Inst., Dartmouth (Nova Scotia).
R. N. Hughes, D. L. Peer, and K. H. Mann.
Limnology and Oceanography, Vol 17, No 1, p 111-121, January 1972. 5 fig, 5 tab, 15 ref.

Descriptors: *Bioindicators, *Benthic fauna, Sediments, Tidal waters, Sea water, Clays, Mud, Biomass, Silts, Gravels, Sands, Soil types, Aquatic soils, Annelids, Amphipoda, Crustaceans, *Canada, Water sampling.
Identifiers: *Multivariate analysis, *St. Margaret's Bay, *Echinoderms, *Polychaetes, Macroinvertebrates, Substrates, Cluster analysis, Prinicpal components analysis, Correlation coefficients, Sample preservation, Pectinaria hyperborea, Synapta, Dendrograms, Gyptis vittata, Scoloplos armiger, Lumbrineris fragilis, Terebellides stroemi, Pherusa plumosa, Tharyx acutus.

Trends in the frequencies of occurrence of polychaetes and echinoderms in St. Margaret's Bay, Nova Scotia, were isolated by principal components analysis and cluster analysis. Representative samples were collected and the polychaetes and echinoderms identified according to standard methods. The organisms were counted and weighed after the removal of surface water by blotting. The total numbers of each species at each station were used for principal components analysis and cluster analysis. Five principal components accounted for 70 percent of the total variance, three of them (46 percent of the variance) associated with sediment type, and one (16 percent of the variance) with distance from the head of the bay, probably with tidal water movements. The largest component of variance (23 percent) was due to the difference between fauna from clay (characterized by Pectinaria hyperborea and Synapta sp.) and fauna from more heterogeneous, coarser sediments. It was concluded that the large, continguous area of soft mud in the deep part of the bay supports a reasonably well-defined, integrated community. (Byrd-Battelle)
W73-07100

SIMULTANEOUS DETERMINATION OF ALUMINUM, COPPER, IRON, AND MANGANESE,
Bridgeport Univ., Conn. Dept. of Chemistry.
J. Paul, and S. M. Shah.
Microchemical Journal, Vol 17, No 2, p 204-209, 1972. 2 tab, 10 ref.

Descriptors: *Aqueous solutions, *Chemical analysis, *Iron, *Copper, *Manganese, *Aluminum, *Separation techniques, *Methodology, Pollutant identification, Heavy metals, Chemical reactions, Solvent extractions.
Identifiers: Reproducibility, Mixtures, Metal complexes, Complexation, Precision, Chemical recovery.

A simple, rapid, accurate and reproducible method for the simultaneous determination of aluminum, copper, iron and manganese is reported. The method is based on the sequential formation and extraction of tri (1,10-phenantroline) iron (II), followed by the selective formation of copper diethyldithiocarbamate and its extraction by n-butyl acetate in the presence of perchloric acid. The remaining aqueous phase containing manganese and aluminum is neutralized with ammonia, extracted twice with chloroform, and manganese determined by formation and extraction of manganese diethyldithiocarbamate into isobutyl acetate, in the presence of perchlorate ions. Aluminum is then determined in the remaining aqueous phase as its 8-hydroxyquinclinate. (Holoman-Battelle)
W73-07102

PRECISE MEASUREMENT OF MICROGRAM LEVELS OF CA-48 IN BIOLOGIC SAMPLES BY NEUTRON-ACTIVATION ANALYSIS,
California Univ., San Francisco. Dept. of Medicine.
J. W. Hansen, and S. C. Prussin.
International Journal of Applied Radiation and Isotopes, Vol 23, No 3, p 109-114, March 1972. 1 tab, 5 ref.

Descriptors: *Measurement, *Neutron activation analysis, Urine, Chemical analysis, Aqueous solutions, Pollutant identification, Alkaline earth metals, Methodology, Calcium.
Identifiers: *Ca-48, *Biological samples, *Trace levels, *Precision, Calcium radioisotopes, Blood, Detection limits, Sample preparation, Serum, Experimental error, Error sources.

A neutron-activation analysis procedure is described which allows measurements of Ca-48 in blood and urine specimens at microgram levels with errors of 2-3 percent. Serum or urine samples were treated with a saturated solution of ammonium oxalate and the precipitate of calcium oxalate was washed three times with a solution consisting of saturated ammonium oxalate, distilled water, and sufficient NaCH to give a pH of 8-9. For serum specimens the initial precipitate was allowed to stand in distilled water for 5 min to lyse any intact blood cells. The final precipitate was dissolved in concentrated nitric acid and the solution transferred to an irradiation capsule for neutron activation. Aliquots of the remaining solution was diluted and analyzed for total calcium by flame photometry. By careful control of the experimental design and data analysis, the procedure has been shown to provide errors of 1-2 percent for Ca determinations in samples containing about 25 micrograms of Ca-48 and 3-6 percent for those containing about 1 microgram of Ca-48. The various technical factors influencing error are discussed and the steps taken to minimize these errors are described. A number of these considerations are generally applicable to other activation methods for analysis of samples of biologic origin. (Holoman - Battelle)
W73-07104

NOTE ON LITHIUM IN SALINE GROUND WATERS,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 03C.
W73-07126

5B. Sources of Pollution

WATER QUALITY OF KAPALAMA CANAL,
Hawaii Univ., Honolulu. Water Resources Research Center.
R. H.F. Young, S. D. Hahn, and J. M. Johnson.
Available from the National Technical Information Service as PB-217 869, $3.00 in paper copy, $0.95 in microfiche. Technical Report No. 59, September 1972. 21 p, 7 fig, 3 tab, 16 ref. OWRR A-027-HI (1).

Descriptors: *Water quality, *Water pollution effects, Bioindicators, Pollutants, Drainage, Enteric bacteria, Storm water, Flow, Coliforms, *Hawaii, Path of pollutants.
Identifiers: *Kapalama Canal.

A water quality survey of the Kapalama Canal was undertaken in 1970 - 1971 to obtain baseline data for evaluation of the pollution potential of that surface drainage channel. The survey included the stretch of canal between the residential area below School Street to the tidal waters downstream of the pineapple canneries effluent discharge ditch. Chemical and bacteriological characteristics of the Canal were assessed through the measurement of the following parameters: pH, DO, alkalinity, hardness, chlorides, total solids, total nitrogen, total phosphorus, BOD5, total coliforms, fecal coliforms, fecal streptococci and Pseudomonas aeruginosa. Results of the survey show that levels of all parameters except pH and alkalinity increased in a downstream direction with high levels particularly noted downstream of the tidal dam, probably due to the effects of effluent discharge from the pineapple canneries outfall ditch. A significant diluting effect was noted during periods of wet weather streamflow. The state water quality standards were exceeded for several parameters: pH, DO, nitrogen and phosphorus in the Class A waters, and total coliforms in both the Class A and Class 2 waters. The average FC:FS and FC:TC ratios for the Class 2 waters were 5.2:1 and 0.25:1, respectively. The high FC:FS ratio indicates that human wastes as well as animal feces are entering Kapalama Canal. Pseudomonas aeruginosa organisms were found in the canal waters and were observed in densities greater than attributed to stormwater runoff in the literature.
W73-06512

EFFECT OF STRIP-MINING ON WATER QUALITY,
Ohio State Univ., Columbus. Water Resources Center.
For primary bibliographic entry see Field 05A.
W73-06515

MATHEMATICAL MODELS OF WATER QUALITY PARAMETERS FOR RIVERS AND ESTUARIES,
Texas A and M Univ., College Station. Water Resources Inst.
R. W. Hann, Jr., and P. J. Young.
Available from the National Technical Information Service as PB-217 877, $10.60 in paper copy, $0.95 in microfiche. Texas Water Resources Institute, College Station, Technical Report 45, October 1972. 424 p, 32 fig, 20 tab, 110 ref, 3 append. OWRR A-014-TEX (1). 14-31-0001-3044. 14-31-0001-3244. 14-31-0001-3544.

Descriptors: *Computer models, *Estuaries, *Mass transport, Finite element analysis, *Texas, Model studies, Stratification, Biochemical oxygen demand, Dissolved oxygen, Aerobic conditions, Anaerobic conditions.
Identifiers: *Houston Ship Channel, Galveston Bay area, *Finite difference models.

The development of computer models for mass transport in estuaries has been an important engineering activity for the past decade. However, only a limited amount of work has been done in modeling the two-dimensional characteristics of partially stratified estuaries. The goals of this study were (1) to develop computer models which could calculate vertical and horizontal mass transport in partially stratified estuaries; (2) to compare the accuracy and usefulness of explicit finite difference models and Crank-Nicolson implicit finite difference models; (3) to demonstrate the applicability of finite difference models to the mass transport characteristics of the Houston Ship Channel; and (4) to summarize existing information on one- and two-dimensional mathematical models that have been applied to significant estuary problems. Explicit and Crank-Nicolson finite difference models were developed for the one- and two-dimensional estuary equations with varying coefficients. The concentration profiles for instantaneous releases and for steady-state conditions were analyzed. Accuracy was determined by comparison with analytical closed-form solutions. Models were developed also to analyze the profiles for biochemical oxygen demand and dissolved oxygen under time-changing conditions, for both aerobic and anaerobic conditions. Applicability of these models to partially stratified estuaries was established by comparisons with dye study data from the Houston Ship Channel. (Runkles-Texas A and M)
W73-06520

NUTRIENT ENRICHMENT OF RUNOFF WATERS BY SOILS. PHASE I: PHOSPHORUS ENRICHMENT POTENTIAL OF URBAN SOILS IN THE CITY OF MADISON,
Wisconsin Univ., Madison. Dept. of Soil Science.
J. C. Ryden, J. K. Syers, and R. F. Harris.
Available from the National Technical Information Service as PB-218 134, $3.00 in paper copy, $0.95 in microfiche. Wisconsin Water Resources Center Technical Report, 1972. 70 p, 13 fig, 9 tab, 150 ref. OWRR A-038-WIS (1) 14-31-0001-3250, 14-31-0001-3550.

Descriptors: *Phosphorus, Water pollution sources, *Fertilizers, Surface runoff, *Urban runoff, *Agricultural runoff, Streams, *Soil chemical properties, *Soil erosion, *Wisconsin.
Identifiers: *Madison (Wisconsin).

An extensive review of the literature pertaining to P in runoff and streams was prepared. A method was developed for determining the potential of eroding noncalcareous and calcareous soil horizons collected from an urban development site for the P encrichment of streams, based on the P sorption-desorption characteristics of the soil materials, as a function of dissolved inorganic P concentrations. Nomograms were constructed to illustrate the relationship between initial inorganic P concentrations (0 to 150 microgram P/l), equilibrium inorganic P concentration, and varying mixtures of soil from Al, Bl and 3Cl horizons using a 400:1 solution:soil ratio. The data can be readily extrapolated to wider solution:soil ratios more realistic in terms of a stream environment. The results demonstrate that soil materials can modify the dissolved inorganic P concentration of waters in which they are carried, by sorption-desorption or dissolution reactions. Because Miami silt loam and related soils are widely distributed in Wisconsin, Illinois, Indiana and Michigan, the research findings are of wide applicability. Furthermore, the experimental approach developed provides a basis for predicting the P enrichment potential not only of soils eroding from urban development sites, but also those carried in runoff from agricultural lands.
W73-06521

SIMULATION OF RESPIRATION IN MICROBIAL SLIME FILMS,
Clemson Univ., S.C. Div. of Interdisciplinary Studies.
For primary bibliographic entry see Field 05C.
W73-06523

THE INFLUENCE OF HERBICIDES USED ON HORTICULTURAL CROPS ON STREAM ECOLOGY,
Michigan State Univ., East Lansing. Dept. of Horticulture.
For primary bibliographic entry see Field 05C.
W73-06527

FURTHER CHARACTERIZATION OF THE WATER QUALITY OF THE NEW HOPE AND LOWER HAW RIVERS INCLUDING BENTHIC MACROINVERTEBRATE DIVERSITY AND TRACE METAL ANALYSES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05C.
W73-06530

SANITARY CONDITIONS OF THE DISCHARGE OF EFFLUENTS FROM THE PRODUCTION OF TETRACYCLINE ANTIBIOTICS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Antibiotikov, Moscow (USSR).
V. F. Karpukhin, G. B. Shteinberg, I. Z. Kats, and I. V. Mashnikov.
Gig Sanit. Vol 36, No 8, p 102-103. 1971.
Identifiers: *Water pollution sources, *Industrial wastes, *Antibiotics, Effluents, Tetracycline antibiotics.

A study of the qualitative composition of the waste waters from the production of tetracycline antibiotics at various stages of the production process showed that the mother liquors and still residues are the polluting effluents. Effluents from washing flasks, test tubes and caps were the least polluting. The effluents from the production of biomycin are also polluters.--Copyright 1972, Biological Abstracts, Inc.
W73-06543

WATER; GROSS RADIOACTIVITY IN SURFACE WATERS OF THE UNITED STATES, APRIL 1972.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-06554

WATER SURVEILLANCE PROGRAMS, JANUARY-MARCH 1972.
National Environmental Research Center, Las Vegas, Nev.
For primary bibliographic entry see Field 05A.
W73-06574

RADIOLOGICAL SURVEILLANCE AROUND THE FLORIDA POWER CORPORATION'S CRYSTAL RIVER POWER REACTOR SITE, 1971.
For primary bibliographic entry see Field 05A.
W73-06575

BIOLOGICAL SURVEY OF SUBMERGED REFUSE,
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
J. B. Pearce.
Marine Pollution Bulletin, Vol 3, No 10, p 157-158, October, 1972. 1 photo, 1 ref.

Descriptors: *Solid wastes, *Biodegradation, *Waste disposal, *Water pollution sources,

Animal growth, Wastes, Underwater, Submerged vegetation stage, Oceans, Contiental shelf, Ultimate disposal, Water pollution, Water pollution control.
Identifiers: Coastal waters.

Baled, compacted domestic refuse was dumped in 200 meters of water off the coast of the British Virgin Islands and closely examined after three months of submersion. The results indicated that few animals managed to establish themselves on or in the bales in that time and degradation would be slow. In addition, the following conclusions can be drawn: no encrusting organisms were found, only a relatively small population of lossely attached or motile organisms was present, and refuse dumped at sea might not only be a factor in spreading harmless micro-organisms but could also introduce pathogens to a variety of organisms important in marine food chains. These observations all suggest that further experimental work should be done with baled or loose refuse to be disposed of at sea, whether in deep or shallow waters. (Mockler-Florida)
W73-06594

THE MOVEMENT AND QUALITY OF COASTAL WATERS: A REVIEW OF MODELS RELEVANT TO LONG ISLAND, NEW YORK,
Center for the Environment and Man, Inc., Hartford, Conn.
L. Ortolano, and P. S. Brown, Jr.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, July 1970, 88 p, 17 fig, 96 ref. NSF GH-63.

Descriptors: *Coasts, *Model studies, *Mathematical models, *Water quality, Hydraulics, Hydrodynamics, Water, Currents (Water), Flow characteristics, Sediment transport, Sands, New York, Hydraulic models.
Identifiers: *Coastal waters, *Long Island, *Coastal water movement, Hydrodynamic models.

The literature on models for predicting flow patterns (including velocity and water height) and the distribution of materials in coastal waters is reviewed. Models that are potentially applicable to the Long Island coastal environment are emphasized. The purposes of modeling and what it means to verify a model are described. The potential utility of hydraulic models, small-scale three dimensional replicas of rivers and harbors, is discussed along with a number of real world applications. Mathematical models are introduced in two contexts: (1) hydrodynamic models used to predict flow patterns, and (2) water quality models used to predict the concentration of substances contained in wastes discharged to water courses. The emphasis is on describing the state-of-the-art and on indicating the extent to which the various models are used in practice. The models described are put in perspective as one possible set of tools potentially useful to the Nassau-Suffolk Regional Planning Board in addressing Long Island's coastal problems. (Davis-Chicago)
W73-06602

TRACE ELEMENT DISTRIBUTIONS IN WATER, SEDIMENT, PHYTOPLANKTON, ZOOPLANKTON AND BENTHOS OF LAKE MICHIGAN: A BASELINE STUDY WITH CALCULATIONS OF CONCENTRATION FACTORS AND BUILDUP OF RADIOISOTOPES IN THE FOOD WEB,
Environmental Research Group, Ann Arbor, Mich.
For primary bibliographic entry see Field 05C.
W73-06625

MIGRATION OF CONTAMINANTS IN SUBSURFACE WATERS, (IN RUSSIAN),
Meditsinskii Institut, Tselinograd (USSR).
N. D. Demin.
Gig Sanit. Vol 36, No 8, p 103-104. 1971.
Identifiers: *Path of pollutants, Bacteriology, Pollutants, Migration, Ponds, *Subsurface waters, Wells.

Some physicochemical and bacteriological data on water from a storage pond and wells are presented. Observations of the migration of contaminants in an alluvial waterbearing horizon showed that chemical and bacteriological contaminants can penetrate 830 m and more depending on the time, hydraulic pressure created by waste waters, velocity of the underground flow and permeability coefficient. Copyright 1972, Biological Abstracts, Inc.
W73-06631

PERSISTENCE AND METABOLISM OF CHLORODIOXINS IN SOILS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
P. C. Kearney, E. A. Woolson, and C. P. Ellington, Jr.
Environmental Science and Technology, Vol 6, No 12, p 1017-1019, November 1972. 3 fig, 3 tab, 6 ref.

Descriptors: *Biodegradation, *Soil analysis, *Persistence, *Metabolism, Chlorinated hydrocarbon pesticides, Radioactivity techniques, Separation techniques, Gas chromatography, Degradation (Decomposition), Maryland.
Identifiers: TCDD, DCDD, C-14, Electron capture gas chromatography, Scintillation counting, Cleanup, Hagerstown (Maryland), Lakeland (Maryland).

The persistence of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) was determined in: Hagerstown and Lakeland (Md.) soils receiving 1, 10, or 100 ppm TCDD after 20, 40, 80, 160, and 350 days. Concentrations of 1.78, 3.56, and 17.8 ppm of C-14-labelled TCDD and 0.7, 1.4, and 7.0 ppm of C-14-labelled DCDD were also added to the same soils. TCDD-treated soil was extracted with a mixture of hexane-acetone and examined by electron-capture gas chromatography after cleanup. DCDD-treated soil was extracted successively with hexane-acetone, ethanol, and hexane. Lipid scintillation counting was used for assaying C-14. After one year, 56 and 63 percent of the originally applied TCDD was recovered in the Hagerstown and Lakeland soils, respectively. Neither 2,7-dichlorodibenzo-p-dioxiin (DCDD) nor TCDD could be detected in soils receiving 10, 100, and 1000 ppm of the 2,4-dichlorophenol or 2,4,5-trichlorphenol after 70 days. A polar metabolite of DCDD-C-14 was detected by thin-layer chromatography in the ethanol soil extract. TCDD is degraded slowly in soils, and TCDD and DCDD are not biosynthesized by microbial condensation reactions. (Little-Battelle)
W73-06632

COPPER AMMONIATE AND ITS EFFECT ON THE BODIES OF FISH, (IN RUSSIAN),
For primary bibliographic entry see Field 05C.
W73-06636

THE ROLE OF PAPER MILL ADDITIVES AS POTENTIAL STREAM POLLUTANTS, DEVELOPMENT OF NUCLEAR TECHNIQUES,
Washington State Univ., Pullman. Coll. of Engineering Research Div.
R. M. Chatters.
Available from the National Technical Information Service as RLO-2221-T-3-2, $3.00 in paper copy, $0.95 in microfiche. Report No. UC 23, Annual Progress Report No 2, March 1, 1972. 64 p, 21 fig, 4 tab, 1 append. Project No. RP 1111, Contract No AEC AT (45-1)-2221.

Descriptors: *Pulp wastes, *Pulp and paper industry, *Radioactivity techniques, *Biochemical oxygen demand, Neutron activation analysis, X-ray fluorescence, Dyes, Bleaching wastes, Tagging, Tracers, Separation techniques, Industrial wastes, Effluents.
Identifiers: *Starch, *Glucose, Adhesives, Whiteners, Fillers, Sugars, Sizing agents, Scintillation counting.

The purpose was to develop nuclear analytical techniques where needed for better controlling paper mill additives to prevent their release into the environment as pollutants. The results of the second year's efforts are reported. A new method for the determination of glucose, and in turn starch, was developed based upon the reduction of mercury compounds by glucose followed by the use of diatomaceous earth to recover all mercury so liberated from its compound. The new technique was satisfactorily employed under actual mill operating conditions. Extensive studies were made in the laboratory and cooperatively with paper mill personnel to determine the correlation between glucose levels and BOD on the same effluent samples. An adhesive-type additive was successfully tagged with a metal element and tested twice under normal mill operating conditions. It was also found that a metallic bleach compound could be readily detected by neutron activation analysis in paper and in effluents. The metal was present in non-toxic quantities in the finished product as well as the effluent. A method was developed for tagging one of the important non-starchy sizing compounds with a metal element. The resultant product was found by a paper-chemicals company to yield identical test results on paper as did the untagged compound. One filler and whitening compound was tested ard found to be satisfactory for neutron activation analysis as well as by means of x-ray fluorescence spectrometry. For neutron activation analysis, a new type of irradiation container was developed and has been adopted by other investigators. Wherever possible during the investigations to date, samples for study have been collected in cooperating paper mills under normal conditions. (Little-Battelle)
W73-06637

ENVIRONMENTAL INDICATORS FOR PESTICIDES,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 05C.
W73-06639

WATER POLLUTION: ORGANIC COMPOUNDS IN THE CHARLES RIVER, BOSTON,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
R. A. Hites, and K. Biemann.
Science, Vol 178, No 4057, p 158-160, October 13, 1972. 1 fig, 1 tab, 16 ref.

Descriptors: *Organic compounds, *Pollutant identification, *Water pollution sources, *Mass spectrometry, Freshwater, Storm runoff, Biochemical oxygen demand, *Massachusetts, Aromatic compounds, Gas chromatography, Solvents, Aqueous solutions, Analytical techniques, Rivers, Cities, Water pollution, Chromatography, Spectrometers, Acids, Separation techniques, Bacteria, Algae.
Identifiers: *Charles River, *Gas liquid chromatography, Sample preparation, n-Alkanes, Alkyl naphthalenes, Alkyl anthracenes, Phenanthrenes, Pyrene, Fluoranthene, Dibutyl phthalate, Di (2-ethylhexyl) phthalates, Chlorobrium, Fuel oil.

Lipophilic organic compounds occurring as pollutants in the Charles River have been analyzed by combination gas chromatography - mass spectrometry, and high-pressure liquid chromatography. Samples were collected from the river, acidified with concentrated hydrochloric acid and then thoroughly mixed with 200 ml of methylene chloride. The methylene chloride layer was separated and the solvent removed at 30 C under

reduced pressure in a rotary evaporator. The residue was dissolved in 200 microliters of methylene chloride and analyzed by gas chromatography and mass spectrometry. The major lipophilic organic compounds present are as follows: normal alkanes (C-15 to C-31), alkyl naphthalenes alkyl anthracenes or phenanthrenes, pyrene, fluoranthene, dibutyl phthalate, and di (2-ethylhexyl) phthalate. The concentration of the naphthalenes (determined by liquid chromatography) correlates with the effective storm-water runoff content of the river. These data suggest a multiplicity of sources ranging from indigenous biological materials to automobile exhaust condensate. (Byrd-Battelle)
W73-06649

THE VERTICAL DISTRIBUTIONS AND DIURNAL MIGRATIONS OF CALANOID COPEPODS COLLECTED ON THE SOND CRUISE, 1965. I. THE TOTAL POPULATION AND GENERAL DISCUSSION,
National Inst. of Oceanography, Wormley (England).
H. S. J. Roe.
Journal of the Marine Biological Association of the United Kingdom, Vol 52, No 2, p 277-314, May 1972. 2 fig, 4 tab, 69 ref.

Descriptors: *Copepods, *Vertical migration, *Dinural distribution, Distribution patterns, Crustaceans, Animal populations, Marine animals, Biorhythms.
Identifiers: *Vertical distribution, *Macroinvertebrates, Calanoida, Pleuromamma xiphias, Pleuromamma abdominalis, Amallophora, Scolecithricella spp, Eucalanus subcrassus, Eucalanus pileatus, Euangaptilus spp.

Two hundred and twelve species of calanoid copepods have been identified from a day and a night series of closing horizontal hauls made between 960 and 40 m off Fuerteventura in the Canary Islands. Displacement volumes show that the bulk of the calanoid population was 500 m depth of both day and night, but the great majority of this population was immature. There was an increase in volume between 300 and 50 m and a decrease between 800 and 300 m by night relative to the day. This volume change is due to an upward movement in the size distribution, the mean body length per depth increasing by night above 460 m and decreasing below 500 m, which results from the migrations of abundant large species such as Pleuromamma xiphias and P. abdominalis. Because of vertical migrations there were more species above 350 m by night than by day but fewer below this depth. The greatest numbers of adult calanoids were found at 40 m (day) and 50 m (night) and there were secondary numerical maxima in midwater by both day and night. There was a decrease of over 30 percent by numbers in the total night catch as compared with the day. This decrease was common to most of the genera sampled, but the reasons for it are obscure. The numbers of species considered to be contaminants at particular depths are very low. The mean body length per depth of adults increased from the surface to 900 m by both day and night. By day the number of species at a given depth increased from the surface to a maximum at 940 m; by night the maximum was at 660 m with secondary maxima and 100 m and 250 m. Previous investigations and the difficulties of making valid comparisons with the present results are discussed. (Holoman-Battelle)
W73-06651

THE VERTICAL DISTRIBUTIONS AND DIURNAL MIGRATIONS OF CALANOID COPEPODS COLLECTED ON THE SOND CRUISE, 1965. II. SYSTEMATIC ACCOUNT: FAMILIES CALANIDAE UP TO AND INCLUDING THE AETIDEIDAE,
National Inst. of Oceanography, Wormley (England).
H. S. J. Roe.
Journal of the Marine Biological Association of the United Kingdom, Vol 52, No 2, p 315-343, May 1972. 7 fig, 2 tab, 28 ref.

Descriptors: *Diurnal distribution, *Copepods, *Vertical migration, *Speciation, *Systematics, *Ecological distribution, Crustaceans, Nocturnal, Marine animals, Distribution patterns, Biorhythms, Zooplankton.
Identifiers: *Vertical distribution, Calanoida, Macroinvertebrates, Eucalanus subcrassus, Eucalanus pileatus, Arthropods, Calanus helgolandicus, Calanus tenuicornis, Nannocalanus minor, Calanoides carinatus, Neocalanus gracilis, Eucalanus elongatus, Eucalanus attenuatus, Rhincalanus nasutus, Rhincalanus cornutus, Spinocalanus angusticeps, Spinocalanus magnus, Spinocalanus spinosus, Spinocalanus abyssalis, Aetideus armatus, Euaetideus acutus, Euaetideus giebrechti, Aetideopsis multiserrata, Chiridius poppei, Gaidius tenuispinus, Gaetanus minor, Gaetanus pileatus, Gaetanus miles, Euchirella messinensis, Euchirella pulchra, Undeuchaeta major, Undeuchaeta plumosa, Chirundina streetsii.

Vertical distributions and diurnal migrations were analyzed for 28 species of calanoid copepods in the families Calanidae up to and including the Aetideidae. The relative abundance, both horizontal and vertical, is given for each species. Most of these species show at least some indication of a vertical migration at night and in some this was extensive, e.g. Undeuchaeta plumosa. Some species, e.g. Neocalanus gracilis, had a single population by day which apparently split into a number of successive numerical maxima at successively shallow depths at night. It is concluded that these numerical maxima result from the times at which the samples were taken and show the depth to which a single daytime population has risen by a particular time at night. Many species showed a marked numerical decrease for an abbreviated day haul taken in the late afternoon at 600 m. Since most of these species are extensive migrants it is concluded that this decrease results from their beginning their vertical migrations before sunset. Vertical segregation between congeneric species is shown by species of Euaetideus, and between closely related species by Undeuchaeta spp., and Chirundina streetsii. A degree of sexual vertical segregation occurred in Gaidius tenuispinus, where the males were found mainly above the females by both day and night. Two size-groups were presented in the female Nannocalanus minor and in both sexes of Eucalanus attenuatus. In the latter species the two groups had different distributions and different behavior, with the small forms apparently having a reversed (downward) migration. N. minor and Spinocalanus abyssalis also show possible reversed migrations but the evidence is inconclusive. (See also W73-06651) (Holoman-Battelle)
W73-06652

ABSTRACT OF PROCEEDINGS, HAZARDOUS POLLUTING SUBSTANCES SYMPOSIUM: ANNEX 1 TO STUDY ON CONTROL OF HAZARDOUS POLLUTING SUBSTANCES HELD AT JUNG HOTEL, NEW ORLEANS, LOUISIANA ON 14-16 SEPTEMBER 1970.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-06654

BIOLOGICAL EFFECTS OF ATMOSPHERIC POLLUTANTS. FLUORIDES.
For primary bibliographic entry see Field 05C.
W73-06670

DEGRADATION OF NAPHTHALENE TO SALICYLIC ACID BY CULTURES OF PSEUDOMONAS DENITRIFICANS AND ACHROMOBACTER SP. FROM THE EFFLUENTS OF PETROLEUM REFINERY,
Slovak Technical Univ., Bratislava (Czechoslovakia). Dept. of Microbiology and Biochemistry.
M. Martonova, B. Skarka, and Z. Radej.
Folia Microbiol. Vol 17, No 1, p 63-65. 1972.
Identifiers: Achromobacter sp, Cultures, *Degradation, Effluents, *Naphthalene, Petroleum, Pseudomonas denitrificans, *Salicylic acid.

The microbial degradation of aromatic hydrocarbons from effluents of a petroleum refinery was investigated, with emphasis on the breakdown of naphthalene to salicylic acid. The microorganisms were grown in a synthetic medium with naphthalene as the sole C source. The effects of pH, temperature, aeration and naphthalene concentration were studied. The optimum conditions for degradation were: pH 6.0, 28 degrees C, 25 ml medium with 1% naphthalene in 500 ml flasks. Salicylic acid was estimated by colorimetric and chromatographic methods. Maximum growth was found on the 5th day of cultivation. P. denitrificans produced 9.0 ug salicylic acid/ml medium, Achromobacter sp. produced 7.1 microgram/ml.--Copyright 1972,Biological Abstracts, Inc.
W73-06672

DISTRIBUTION OF PELAGIC TUNICATES IN THE WESTERN PART OF THE BAY OF BENGAL,
Andhra Univ., Waltair (India). Dept. of Zoology.
P. V. Bhavanarayana, and P. N. Ganapati.
Proceedings of the Indian Academy of Sciences, Section B, Vol 75, No 1, p 1-14, January 1972. 4 tab, 35 ref.

Descriptors: *Bioindicators, *Ecological distribution, *Seasonal, *Water circulation, Water temperature, Salinity, Sea water, Rainfall, Currents (Water), Depth, Distribution patterns, Water quality, Zooplankton, Temporal distribution, Systematics, Monsoons, Hydrography, Marine animals.
Identifiers: *Tunicates, *Bay of Bengal, *Pelagic animals, Oikopleura longicauda, Oikopleura fusiformis, Oikopleura dioica, Oikopleura intermedia, Fritillaria pellucida, Thalia democratica, Fritillaria borealis f. sargassi, Fritillaria fraudax, Doliolum denticulatum, Chordates, Metacalfina hexagonia, Pyrosoma atlanticum, Pyrosoma, Pegea, Oikopleura albicans, Oikopleura cophocerca, Oikopleurarufescens, Megalocerus huxleyi, Pelagopleura gracilis.

The distribution of pelagic tunicates in the western part of the Bay of Bengal is studied in relation to the water movements and their association temperature and salinity structure at different levels in the sea. A total of thiry-three species and two varieties of pelagic tunicates are reported from the western part of the Bay of Bengal. The stability of Oikopleura intermedia, Fritillaria borealis f. sargassi, Fritillaria pellucida, Thalia democratica var. orientalis and the western-Pacific form of Thalia democratica as indicators of water movements is suggested. (Byrd-Battelle)
W73-06676

ESTIMATING THE RATE OF DEGRADATION OF CELLULOSE FIBERS IN WATER,
Uppsala Univ., (Sweden). Inst. of Limnology.
For primary bibliographic entry see Field 05C.
W73-06678

MICROBIOLOGY OF WASTE TREATMENT,
Environmental Protection Agency, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 05D.
W73-06681

THE FAST BREEDER REACTOR: A SOURCE OF ABUNDANT POWER FOR THE FUTURE,
North American Rockwell Corp., Canoga Park, Calif. Atomics International Div.
For primary bibliographic entry see Field 06D.
W73-06685

UPSTREAM BOUNDARY-LAYER SEPARATION IN STRATIFIED FLOW,
California Univ., San Diego, La Jolla. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 08B.
W73-06690

HYDROTHERMAL ANALYSIS BY FINITE ELEMENT METHOD,
Sargent and Lundy, Chicago, Ill.
L. A. Loziuk, J. C. Anderson, and T. Belytschko.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY11, p 1983-1998, November 1972. 11 fig, 11 ref, 2 append.

Descriptors: *Mathematical studies, *Thermal pollution, *Temperature, *Model studies, Analytical techniques, Finite element analysis, Aquatic environment, Cooling water, Cooling towers, Measurement, Discharge, Effluents, Hydraulic engineering, Currents, Isotherms, Density, Flow, Rivers, Lakes, Ponds, Nuclear powerplants, Velocity, Powerplants.
Identifiers: Galerkin's method.

The finite element method is used to predict the horizontal temperature distribution resulting from the discharge of a heated effluent into a body of water. The methods of heat transfer which are considered include the heat exchange at the air water interface, advection and diffusion. The two-dimensional, steady state solution to the governing field equation is approximated by applying Galerkin's method. Comparison of the numerical solution with the exact solution for a one-dimensional example is in good agreement. The analytical procedure is also used to predict the distribution of a heated effluent which is discharged into a river and the results are compared with those obtained for a model study. The analytical technique can be applied to rivers, lakes or cooling ponds. (Jerome-Vanderbilt)
W73-06693

SOME OBSERVATIONS OF TEMPERATURE FLUCTUATIONS IN THE COASTAL REGION OF THE BALTIC,
Swedish Natural Science Research Council, Stockholm (Sweden).
For primary bibliographic entry see Field 07B.
W73-06698

BY-PRODUCTS OF NUCLEAR POWER,
Atomic Energy Research Establishment, Harwell (England). Separation Processes Group.
For primary bibliographic entry see Field 05G.
W73-06699

APPARENT HORIZONTAL DIFFUSION IN STRATIFIED VERTICAL SHEAR FLOW,
Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.
For primary bibliographic entry see Field 02E.
W73-06700

PROPAGATION OF A NONSPHERICAL THERMAL WAVE,
Science Applications, Inc, La Jolla, Calif.
For primary bibliographic entry see Field 02E.
W73-06702

ON THE ADVECTIVE AND DIFFUSIVE HEAT BALANCE IN THE INTERIOR OF A SUBTROPICAL OCEAN,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 02E.
W73-06703

EFFECTS OF TEMPERATURE VARIATION ON THE FATTY ACID COMPOSITION OF CANDIDA UTILIS,
Newcastle-upon-Tyne Univ. (England). Dept. of Microbiology.
For primary bibliographic entry see Field 05C.
W73-06704

RELATIVE RATE OF CHLORIDE MOVEMENT IN LEACHING OF SURFACE SOILS,
Agricultural Research Service, Durant, Okla. Water Quality Management Lab.
For primary bibliographic entry see Field 02G.
W73-06709

REACTOR CALCULATION AND MATHEMATICAL MODELS FOR WATER QUALITY - PRELIMINARY STUDY (CALCUL DE REACTEUR ET MODELES MATHEMATIQUES DE QUALITE DES EAUX - ETUDE PRELIMINAIRE),
D. Couillard, and M. Pedneault.
INRS-Eau, Technical Report No 7, 1972, 73 p, 7 fig, 12 ref, 2 append.

Descriptors: *Model studies, *Oxygen demand, *Oxygen sag, *Dissolved oxygen, *Biochemical oxygen demand, Chemical oxygen demand, Mixing, Oxygenation, Aeration, Dispersion, Path of pollutants, Water pollution sources.
Identifiers: *Chemical reactor theory, Oxygen saturation, Oxygen concentration, Stream analysis.

Mathematical models for the biochemical oxygen demand and dissolved oxygen content of rivers are of the same form as those of a tubular chemical reactor. Consequently, models of water quality can be studied using the chemical reactor theory. This theory can also be used on mixed models composed of different types of reactor (plug flow, dispersion model, backmix flow reactor, dead water zones, etc) showing various types of interconnecting systems (in series, in parallel, etc). (Cantin-INRS-Eau)
W73-06738

ION-EXCHANGE SYSTEM TO TREAT HIGH-NITRATE WELL WATER,
Bowne (Sidney B.) and Son. Mineola, N.Y.
For primary bibliographic entry see Field 05F.
W73-06741

WATER-BORNE TYPHOID FEVER CAUSED BY AN UNUSUAL VI-PHAGE TYPE IN EDINBURGH,
Western General Hospital, Edinburgh (Scotland). Central Microbiological Lab.
N. K. Conn, C. S. Heymann, A. Jamieson, J. M. McWilliam, and T. G. Scott.
J Hyg. Vol 70, No 2, p 245-253. 1972. Illus.
Identifiers: *Water pollution sources, Edinburgh, Phage, Salmonella typhi, Scotland, *Typhoid fever, Rivers.

Investigation of a small series of cases of typhoid fever infected in a river between 1963 and 1970 revealed that all were caused by a single source, a carrier of a rare phage type of Salmonella typhi. The contamination of the river resulted from an incorrect sewage connection with a surface water drain outfall into the river.–Copyright 1972, Biological Abstracts, Inc.
W73-06744

DENITRIFICATION AND NITRATE REDUCTION IN WISCONSIN LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
R. L. Chen, D. R. Keeney, D. A. Graetz, and A. J. Holding.
Journal of Environmental Quality, Vol 1, No 2, p 158-162, April-June, 1972. 5 fig, 2 tab, 21 ref. EPA Project 16010 EHR.

Descriptors: *Nitrification, *Denitrification, *Nitrates, *Nutrient removal, *Water pollution sources, Water quality, Laboratory tests, Sediments, Ground water, Eutrophication.
Identifiers: *Seepage lakes.

Laboratory and field experiments were conducted to investigate the fate of 15 N labelled NO3-N in Wisconsin lake sediment-water systems. Approximately 90% of the added NO3-N disappeared from a calcareous sediment compared to about 40% from a non-calcareous sediment after 48 hours when incubated under helium; this was a laboratory study result. The recovery of significant amounts of NH4 -N particularly in calcareous sediment indicated that immobilized N was subject to rapid mineralization Nitrate-15 N not accounted for was assumed lost through denitrification. In field studies 15NO3-N added to calcareous sediment samples and returned to the lake bottom in wide mouth plastic bottles disappeared within 4 days. About 37% of the added NO3-N was in the organic and NH4-N fractions after 4 days while the remaining 63% was lost through denitrification. These data illustrate that denitrification and nitrate reduction in sediments receiving nitrate from groundwaters must be evaluated in calculating nitrogen budgets of seepage lakes. (Smith-Texas)
W73-06751

AFLATOXIN FORMATION IN FEEDLOT WASTES AND REMOVAL DURING WATER TREATMENT PROCEDURES,
Colorado State Univ., Ft. Collins.
For primary bibliographic entry see Field 05D.
W73-06761

HYDROGEOLOGY OF SOLID WASTE DISPOSAL SITES IN MADISON, WISCONSIN,
Wisconsin Univ., Madison.
R. F. Kaufmann.
Available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Michigan, 48106, Order No. 71-2222. Ph. D. Dissertation, 436 p, 1970.

Descriptors: *Hydrogeology, *Landfills, *Groundwater, Water pollution sources, Water qualitycontrol, *Waste disposal, Ultimate disposal, Leachate, Chemical reactions, Nitrogen, Phosphorus, *Wisconsin, Urbanization, Runoff.
Identifiers: *Public relations, *Madison (Wis).

The hydrogeologic environments of two existing and 24 prospective sanitary landfill sites were examined in Madison, Wisconsin. Although the pollution of water resources adjacent to the present landfills is directly related to the flow systems unique to each site, adverse effects to either surface or ground water resources have been very limited. Leachate discharge from landfills is primarily lateral to adjacent groundwater and surface water resources resulting in large, but local, increases in dissolved chemical species over very short travel distances. Major chemical changes in water quality, such as organic and inorganic nitrogen levels and phosphorus levels, are believed due to decreased base flow and runoff modifications caused by urbanization. There is a need for a strong public relations campaign preceding engineering and scientific studies related to site selection, evaluation, and design. (Smith-Texas)
W73-06762

NATURAL CONCENTRATION OF TUNGSTEN IN WATER SOURCES OF CERTAIN POPULATED AREAS IN THE MIDDLE AND SOUTHERN URALS,
Institut Gigieny Truda i Profzabolevanii, Sverdlovsk (USSR).
V. G. Nadeenko, and N. N. Petrova.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 279-280, January-March, 1971. 1 tab. Trans from Gigiena i Sanitariya.

Descriptors: *Heavy metals, *Water supply, *Potable water, *Organoleptic properties, Groundwater, Water quality, Water quality standards.
Identifiers: *Tungsten, USSR, *Urals.

Tungsten has been found in the healthy bodies of individuals killed in accidents. Investigations were made to determine concentration of tungsten in surface waters and subsurface waters. The results indicate that the tungsten concentrations are below the level of the recommended maximum permissible concentration, which was set at 0.1 mg/l. (Smith-Texas)
W73-06774

SURVIVAL OF ENTEROVIRUSES AND ADENOVIRUSES IN WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
G. A. Bagdasar'yan, and R. M. Abieva.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 333-337, January-March, 1971. 3 fig, 12 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Water pollution, *Water quality, *Pollution abatement, *Viruses, *E. Coli, Proteins, Organic wastes, Temperature, Water treatment.
Identifiers: *Enteroviruses, *Adenoviruses, USSR, Epidemic hepatitus.

Water plays a significant role in the transmission of intestinal viral infections. Important viruses found in water include enteroviruses, adenoviruses and the virus or viruses of epidemic hepatitis. Studies revealed certain principles governing the survival time of the investigated strains. The survival times of the enteroviruses and adenoviruses were found to be largely dependent upon the temperature and the degree of pollution as well as upon the individual resistances of the strain. In all experiments, survival times were distinctly longer in more heavily polluted water, that is, water containing a heavier admixture of organic and mineral substances. This effect is probably due to the protection role of protein components. Of all the microorganisms investigated E. coli had the longest survival time of 300 days in water polluted to varying degrees. (Smith-Texas)
W73-06778

HYGIENIC CHARACTERISTICS OF THE NEMATOCIDE NEMAGON IN RELATION TO WATER POLLUTION CONTROL,
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Environmental Hygiene.
N. N. Rakhmatullaev.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 344-348, January-March, 1971. 3 fig, 1 tab, 5 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Nematocides, *Water pollution, *Water pollution control, Water pollution sources, Water quality, Pollution abatement, Laboratory tests, Groundwater, Storm runoff, Effluents, Organoleptic properties.
Identifiers: *Nemagon, *USSR.

The danger that nemagon may enter water bodies along with effluents and with groundwater and storm waters when used as an agricultural nematocide necessitates the establishment of a scientifically validated standard for its concentration in water bodies and points for a need for special field investigations. Experiments were conducted with laboratory test animals and a table of results is included. These results indicate that the standard for nemagon in water bodies should be a recommended maximum permissible concentration of 0.01 mg/l. (Smith-Texas)
W73-06779

DETERMINATION OF COPPER IN EFFLUENTS AND NATURAL WATERS BY MEANS OF AMALGAN POLAROGRAPHY WITH ACCUMULATION,
For primary bibliographic entry see Field 05A.
W73-06782

ON THE CONTENT OF CARCINOGENIC HYDROCARBONS IN SURFACE WATERS,
Institut Eksperimentalnoi i Klinicheskoi Onkologii, Moscow (USSR).
A. P. Il'nitskii, L. G. Roxhnova, and T. V. Drozdova.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos. 4-6, p 316-317, April-June, 1971. Trans from Gigiena i Sanitariya.

Descriptors: Pollutants, *Algae, *Sediments, *Water quality, Industrial wastes, Agriculture, Water pollution sources, Water pollution control, Laboratory tests, Effluents.
Identifiers: *USSR, *Benzapyrene, *Carcinogenic hydrocarbons.

Studies were made of the content of benzapyrene in planktonic microorganisms, algae, higher aquatic plants, bottom sand and bottom sediments and also in the water of certain water bodies of the USSR. Results from samples collected in industrial and agricultural districts were compared with those from samples collected in rural areas free from intensive shipping or discharge of effluents. The latter revealed considerably lower benzapyrene concentrations. The results confirmed the possibility that there is a normal level of benzapyrene and other carcinogenic hydrocarbons in the environment. This knowledge may provide a starting point for the determination of the permissible concentrations of these substances in the human environment. (Smith-Texas)
W73-06788

HYGIENIC STANDARDS FOR BENZENESULFONAMIDE AND BENZENESULFONYL CHLORIDE AS INDUSTRIAL POLLUTANTS IN SURFACE WATERS,
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Environmental Hygiene.
D. S. Khuramshin.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 4-6, p 353-358, April-June, 1971. 2 fig, 11 ref. Trans from Gigiena i Sanitariya.

Descriptors: Pollutants, *Industrial wastes, Water pollution sources, *Organoleptic properties, *Toxicity, Chemical wastes, Water pollution control, Water quality control, Effluents, Public health, Water supply, *Water quality standards.
Identifiers: *USSR, *Monochlormide B.

Field and experimental studies were made of the hygienic aspects of the protection of surface waters against pollution by industrial effluents from the manufacture of monochlormide B. At the production of monochlormide B the residual amounts of its half products benzenesulfonamide and benzenesulfonyl chloride are discharged in the effluents. The threshold concentrations of the two compounds judging by their noxious effects on the organoleptic properties of water, were at the level of 6 and 0.5 mg/l respectively. Further tests placed the maximum permissible concentration in water bodies of benzenesulfonyl chloride at a level of 0.5 mg/l according to the organoleptic index of noxiousness and that of benzenesulfonamide at 6 mg/l according to the sanitary toxicologic index. (Smith-Texas)
W73-06790

STUDIES OF THE CONTENT OF POLYCYCLIC HYDROCARBONS IN EFFLUENTS OF PETROCHEMICAL INDUSTRY AND SURFACE WATERS,
Institute of General and Municipal Hygiene, Moscow (USSR).
K. P. Ershova.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 4-6, p 474-475, April-June, 1971. Trans from Gigiena i Sanitariya.

Descriptors: Pollutants, *Industrial wastes, *Chemical wastes, *Water pollution sources, Water pollution control, Water quality control, Distillation, Aqueous solutions, *Effluents, Analytical techniques, Recycling, Sewers.
Identifiers: *USSR, *Petrochemical wastes, *Carcinogenic hydrocarbons, Benzapyrene.

Investigations were made of effluents from individual industrial installations. Analyses were performed on averaged samples of effluents in amounts of up to 6 liters which were extracted with diethyl ether of tested purity. The highest concentrations of 3,4-benzpyrene and 1,2-benzanthrancene were found in the aqueous distillate from installations for tar distillation and pyrolysis. 3,4-benzapyrene was also found in the sewer for lightly polluted effluents that had been partially converted to recycled water. These findings confirm the danger that surface waters may be polluted with carcinogenic hydrocarbons introduced by effluents from petrochemical plants. (Smith-Texas)
W73-06791

STUDIES OF SANITARY STATUS OF SHORE WATERS OF THE SEA OF AZOV AT TAGANROG,
Nauchno-Issledovatelskii Institut Epidemiologii, Mikrobiologii i Gigieny, Rostov-na-Donu (USSR).
V. A. Prokopenko, G. A. Tsaturova, and T. A. Stukalova.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos. 4-6, p 476-477, April-June, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Sea water, *Water pollution, *Sewage effluents, Water pollution control, *Outfalls, Wind tides, Winds, Currents (Water), Water pollution sources, Pollutants, Sewage disposal, Coliforms, Water quality, Path of pollutants.
Identifiers: USSR, *Taganrog, *Sea of Azov.

Three hundred and 96 samples of sea water were taken in order to study the sanitary conditions in the shore waters of the Sea Azov at Taganrog. The shorewaters were found to be much heavily polluted along the Eastern Coast of the sea than along its Western coast, with a considerably higher oxidability, BOD and coli index. The principal role in the transport and dissiptation of pollution was played by the winds and wind induced currents. It is considered necessary to prohibit the discharge

of raw sewage to inshore waters, to remove all the existing outfalls on the Eastern Coast of Taganrog, to connect all the buildings on the coast to general sewerage, to discharge sewage in a decentralized fashion, and to locate the discharge site west of the water use zones in an area with thorough wind mixing at a sufficient distance from the shore. (Smith-Texas)
W73-06792

ON POLLUTION OF SUBSURFACE WATERS,
N. P. Sokolov.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 4-6, p 478-479, April-June, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Water pollution, *Water quality, *Pollution abatement, Ground water, Subsurface waters, Water pollution sources, Water pollution control, Water treatment, *Wells, Well spacings, Water supply.
Identifiers: *USSR.

Causes of pollution in an aquifer used for decentralized water supply were investigated. Five public wells were taken under special supervision and their water was investigated frequently for two years. All the wells satisfied sanitary engineering requirements. The results demonstrated increasing pollution of ground waters in the direction from the first well to the last well according to their proximity to a local polluted brook. Under these conditions the problem of providing the towns inhibitants with water of good quality could only be solved by the construction of a well-ramified network of municipal waterworks with hydrants. (Smith-Texas)
W73-06793

SANITARY BACTERIOLOGICAL AND HYDROBIOLOGICAL EVALUATION OF WATER SOURCES IN WEST SIBERIA,
Graduate Medical Inst., Novokuznetsk (USSR).
A. I. Panaiotti.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 4-6, p 480-481, April-June, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Water supply, *Potable water, *Water pollution, Water pollution control, Water pollution sources, Water quality, Water quality control, Surface waters, Public health, Domestic water.
Identifiers: USSR, *Siberia (Western).

Data are provided on sanitary topographic descriptions of 75 settlements and the sanitary ratings of their water sources, as well as the results of bacteriological investigations of natural water samples in the biological control of water bodies. The representative statistically significant data revealed inadequate centralization of the domestic and drinking water supply for settlements so that the inhabitants mostly use water from open sources which are becoming increasingly polluted. The results provide a basis for rational domestic and drinking water supplies in developing settlements in West Siberia. (Smith-Texas)
W73-06794

TIDAL CIRCULATION AND SEWAGE POLLUTION IN A TROPICAL MARINE LAGOON,
Trust Territory of the Pacific Islands, Koror, Caroline Islands. Entomology Lab.
J. T. Hardy, and S. A. Hardy.
Environmental Pollution, Vol 3, No 3, p 195-203, July 1972. 2 fig, 2 tab, 8 ref.

Descriptors: *Sea water, *Water pollution, *Water quality, *Public health, *Sewage disposal, *Lagoons, Marine plants, Marine fish, Water pollution control, Tidal effects, Tidal waters, Coliforms.
Identifiers: Iwayama Bay, Palau, U.S. Trust Territory of the Pacific.

Documentation of pollution in tropical marine lagoons is scarce, although such habitats serve as collecting points for domestic sewage. Untreated sewage effluents and tidal circulation patterns were monitored in Iwayama Bay, Palau, U.S. Trust Territory of the Pacific, using relatively simple field techniques. The results indicated that: (1) the total volume exchanged with water outside the lagoon during a mean tidal cycle was approximately 15% of the total lagoon volume, (2) a considerable portion of the water in the lagoon is highly polluted and greatly exceeds the water guidelines for limits on fecal coliform, (3) the enclosed nature of the lagoon and relatively restricted exchange in flushing with the open ocean make the area an undesirable location for sewage disposal and (4) since untreated sewage empties into a popular fishing area, the present condition may represent a health hazard to the local community. (Smith-Texas)
W73-06795

CHANGES IN RIVER WATER QUALITY RESULTING FROM ORGANIC-FREE EFFLUENTS CONTAINING AMMONIA,
New York, Univ., N.Y. School of Engineering Science.
R. R. Cardenas, Jr.
Available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Michigan 48106. Order No 71-18, 525. Ph. D. Dissertation, 231 p, 1970.

Descriptors: *Ammonia, Water quality, *Water quality control, *Effluents, *Water pollution control, *Oxidation, Oxygen demand, Laboratory tests, Nitrites, Nitrification, Path of pollutants.
Identifiers: *Removal rates, *Biological oxidation.

Ammonia is the second most important compound capable of undergoing biological oxidation and causing oxidation depletion in receiving waters, after organic carbonaceous fraction in waste waters has been reduced to an insignificant quantity. A continuously flowing 18 stage laboratory river model, complete with natural stream bottom, was constructed to investigate this ammonia oxidation phenomena. The experimental results on the continuously flowing river model showed a well defined pattern for ammonia oxidation characterized by rapid oxidation rates of up to 6.6 mg/l per day of NH3-N, no lag and very low levels of nitrite. The experimental results indicate that nitrification is carried out predominantly by an attached rather than a suspended nitrifying population. The removal rate of ammonia in batch, in situ reactors was constant, or zero order, providing nitrifying populations were not limiting. (Smith-Texas)
W73-06799

MIXING MODEL PREDICTION OF FLUORIDE DISTRIBUTION IN CHESAPEAKE BAY,
Naval Research Lab., Washington, D.C.
T. B. Warner.
Journal of Geophysical Research, Vol 77, No 15, p 2728-2732, May 20, 1972. 1 fig, 18 ref.

Descriptors: *Fluorides, *Chesapeake Bay, *Estuaries, Forecasting, Model studies, Inflow, Tributaries, Water quality, Mixing, Correlation analysis, Equations, Sampling, Water chemistry, Chemical analysis.
Identifiers: Fluoride distribution.

If estuarine waters are simple mixtures of river water and sea water, then amounts of trace constituents expected at a given location (if there in not a source or sink within the system) can be predicted from measured chlorinities and knowledge of the composition of fresh- and sea-water inputs. This simple model was tested by comparing measured and predicted fluoride concentrations in Chesapeake Bay surface water and predicted the distribution within 2 to 3% depending on the variability of input fresh-water sources. Thus there are no important sinks for fluoride within the system. This approach allows identification of nonconservative species and can be useful for the quick identification of the probable direction toward and magnitude of sources of conservative polluting substances. Variations in input waters can be reliably inferred from measurements in the body of the estuary far from the source. (Woodard-USGS)
W73-06813

TRANSFER OF INORGANIC MERCURY TO MILK OF GOATS,
South Dakota School of Mines and Technology, Rapid City.
M. Howe, J. McGee, and F. W. Lengemann.
Nature, Vol 237, No 5357, p 516-518, June 30, 1972. 2 fig, 1 tab, 7 ref.

Descriptors: *Goats, *Milk, *Mercury, *Radioisotopes, Diets, Metabolism, Inorganic compounds, Distribution, Food web, Absorption, Path of pollutants, Transfer.
Identifiers: Excretion.

Lactating goats were dosed orally and intravenously with Hg (203)C12 and studied for 9 and 18 days respectively. The feces, urine, milk, and blood were collected and counted to determine the distribution of the Hg203 with time. The peak activity in the feces was at day 2 and in the urine at day 3. The content of Hg203 increased in milk during the first 3 days and then declined. About 95% of the radiomercury was recovered in the feces, 0.4 to 4.5% in the urine and only 0.006 to 0.039% in the milk when it was administered orally. Eighteen days after intravenous injection of the radiomercury, 25% was excreted in the feces, 25% in the urine and 0.9% in the milk. Nine days after intravenous dosing there was about 100-fold difference between blood and milk contents of Hg203, compared with a 10-fold difference when HgC12 was given orally. It was concluded that inorganic mercury is incompletely absorbed from the digestive tract and only a small fraction of that absorbed is transferred to milk. (Eagle-Vanderbilt)
W73-06867

CONTAMINATION OF SOIL AND VEGETATION NEAR A ZINC SMELTER BY ZINC, CADMIUM, COPPER, AND LEAD,
Rutgers - The State Univ., New Brunswick, N. J. Inst. of Microbiology.
M. J. Buchauer.
Environmental Science and Technology, Vol 7, No 2, p 131-135, February 1973. 3 fig, 2 tab, 17 ref.

Descriptors: *Soil contamination, *Path of pollutants, *Heavy metals, Vegetation, Biology, Chemistry, Air pollution, *Zinc, *Cadmium, Soil tests, Sampling, Statistics, *Lead, *Copper, Industrial waste, Mixing.
Identifiers: Smelting.

The area surrounding two zinc smelters in Palmerton, Pa. was investigated for contamination of soil and vegetation due to airborne heavy metals. Soil was tested at pits excavated in five sites ranging from 1 to 40 Km in distance from the smelters and foliage samples were taken and analyzed. In the downwind area immediately adjacent to the smelter with the greatest emissions, the concentrations were found to be the highest. Concentrations of all metals decreased sharply with depth of soil, due to their insolubility. The metal concentrations in vegetation decreased with distance from the smelter and appeared to be at background levels in samples collected at a distance of 14 km. Ambient metal oxide particles entering foliage remain biologically inert, while metals entering via roots

produce immediate and significant toxic effects. (Jerome-Vanderbilt)
W73-06870

TRACE METAL ENRICHMENT IN THE SEA-SURFACE MICROLAYER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 05A.
W73-06873

ASSOCIATION CONSTANTS OF METHYMERCURY WITH SULFHYDRYL AND OTHER BASES,
National Inst. of Arthritis and Metabolic Diseases, Bethesda, Md.
For primary bibliographic entry see Field 05A.
W73-06877

SUBTLE CONSEQUENCES OF METHYLMERCURY EXPOSURE: BEHAVIORAL DEVIATIONS IN OFFSPRING OF TREATED MOTHERS,
Minnesota Univ., Minneapolis. Coll. of Medical Science.
For primary bibliographic entry see Field 05C.
W73-06878

A TWO-COMPARTMENT, THREE-PARAMETER MODEL FOR THE ABSORPTION AND RETENTION OF INGESTED ELEMENTS BY ANIMALS,
Oak Ridge National Lab., Tenn.
R. A. Goldstein, and J. W. Elwood.
Ecology, Vol 52, No 5, p 935-939, 1971. 3 fig, 17 ref.

Descriptors: *Heavy metals, *Pesticides, *Animal metabolism, *Mathematical models, Pathology, Animal pathology, Mathematical studies, Model studies, Radioisotopes, Path of pollutants, Ecological distribution, Environmental effects, Nutrients.

In many experiments on the absorption and retention of ingested elements, the measured retention curve is fitted to the sum of two exponental functions. The model used most often to interpret results assumes that the instantaneous rate of absorption of an element is proportional to its instantaneous rate of ingestion. A model is proposed that assumes the instantaneous rate of absorption is proportional to the amount of unabsorbed element in the gut. The models lead to different interpretations of the parameters of the retention curve and to different functional descriptions of the accumulation of absorbed element in the body. Data are presented to support the proposed model over the commonly used model. Since both models are of equal mathematical complexity, there is no justification for favoring the commonly used model. Suggestions are made about how modeling should be incorporated into ecological studies. Models based on meaningful and testable hypotheses should be formulated prior to data collection. (Oleszkiewicz-Vanderbilt)
W73-06883

THE POSSIBLE IMPORTANCE OF FECAL MATERIAL IN THE BIOLOGICAL AMPLIFICATION OF TRACE AND HEAVY METALS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
P. N. Boothe, and G. A. Knauer.
Limnology and Oceanography, Vol 17, No 2, p 270-274, March 1972. 2 tab, 25 ref.

Descriptors: *Aquatic algae, *Crabs, *Food chains, *Heavy metals, Biochemistry, Oceanography, Marine environment, Kelps, Path of pollutants, Arsenic compounds, Cadmium, Cobalt, Chromium, Copper, Iron, Manganese, Lead, Zinc, Laboratory tests, Spectroscopy.
Identifiers: Macrocystis pyrifera, Pugettia products.

The concentrations of As, Cd, Co, Cr, Cu, Fe, Mn, Pb, and Zn in a brown alga, Macrocystis pyrifera (Linnaeus), and in fecal material of the crab Pugettia producta (Randall) fed exclusively on M. pyrifera were measured by atomic absorption spectroscopy. In this closed system consisting of a primary producer and a primary consumer, the magnitude of concentration of these elements in the resulting feces of the consumer was determined. Except for Cr and Cd, whose concentrations in the fecal material were less than in the kelp, all other elements showed levels in the feces 2.3-14 times those in the algae. These data strengthen the suggestion that fecal material may play a significant role in the cycling of elements in the marine environment. (Jerome-Vanderbilt)
W73-06887

MERCURY IN NORTH-EASTERN ATLANTIC OCEAN WATER,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05A.
W73-06889

WATER QUALITY AFTER A DISASTER,
Los Angeles Dept. of Water and Power, Calif.
G. W. Adrian, A. Goldman, and A. A. Porthal.
Journal of the Water Works Association, Vol 64, No 8, p 481-485, August 1972. 3 photo.

Descriptors: *Disasters, *Water quality, Water distribution (Applied), Social aspects, Personnel management, Training, Communications, Design, Planning.
Identifiers: *Water supply facilities, Water system design.

An emergency arising from a major disaster, such as an earthquake of great magnitude, that causes sudden, extensive, and disruptive damage to water system facilities may dramatize ensuing problems and evoke responses of heroic proportions or it may engender disorganization, panic, and fear. The water utility must avoid even the appearance of negative manifestations as it systematically goes about the job of restoring the water system for the use of the public. Several items are considered important in setting up a plan of action for an emergency. (1) Design the system with resistance to damage in mind and with backup equipment for all essential elements. (2) Train personnel to know what they are doing and why. Drill them in emergency procedures. (3) Keep communications simple, and use written instructions where necessary to avoid confusion. (4) Arrange to have all public announcements coordinated through a public relations office or other single source in the water utility. (5) Encourage interaction among employees in different divisions and at different levels. (6) Keep the recovery plan fexible. (Davis-Chicago)
W73-06910

OVERFED,
For primary bibliographic entry see Field 05C.
W73-06923

THE TIDE OF INDUSTRIAL WASTES,
J. McCaull.
Environment, Vol 14, No 10, p 30-39, December 1972, 3 tab, 4 photo, 21 ref.

Descriptors: *Water quality, *Industrial wastes, *Water pollution sources, *Economics, Technology, Recycling, Water reuse, Chemical wastes, Organic compounds, Management, Political aspects, Financing, Waste water treatment.
Identifiers: *Stream pollution, *Technological advances, Economic incentives, Public financing.

Industries cause an estimated third of all stream pollution in the United States. Yet efforts to counteract this source of contamination are counterbalanced by powerful economic incentives that help to continue or even intensify this source of pollution. For example, some segments of industry are turning to new materials or techniques to speed production at the cost of increased environmental degradation. Although there are countertrends, such as recycling and advanced purification of water for some industrial uses, the net effect may be further decline in water quality as industrial production curves continue to rise. Discussed in detail are the increase in wastes from new technologies; large waste discharges from outdated technologies; the increase in environmental pollution due to increased quantities of complex chemicals being discharged to the environment, especially complex organic compounds; the tendency for industry to prefer conventional treatment methods, even when inadequate or inefficient; paper pollution; and the political and management implications of using public funds for industrial waste water treatment. (Davis-Chicago)
W73-06924

ASSAULT ON A LAKE,
J. McCaull.
Environment, Vol 14, No 7, p 32-39, September 1972, 4 photo, 17 ref.

Descriptors: *Lake Michigan, Water pollution control, *Management, *Planning, Water pollution sources, Waste water disposal, Diversion, Thermal pollution, Nuclear power plants, Radioactive wastes, Chemical wastes, DDT, Waste disposal, Attitudes, Illinois.
Identifiers: *Chicago metropolitan area, *Metropolitan water resources management.

The problem of water pollution control is discussed using Lake Michigan and the Chicago Metropolitan area as a case study. The sequence of reactions to continued water pollution in the south end of Lake Michigan for the last century is reviewed and analyzed. Several major pollution topics are discussed in detail: the diversion of Chicago's waste water from Lake Michigan to the Mississippi River system; thermal pollution of Lake Michigan, primarily from thermal electric plants, nuclear and conventional; radioactive wastes; and the accumulation of chemicals in the Lake, especially DDT. It is concluded that the early patterns of thinking about waste disposal persist today with only a token integration of the insights provided by the biological sciences. Often enough it is only when the damage is done that biological investigation is instituted. Today's technology of water pollution control is based on pragmatic concepts that need thorough reevaluation if a comprehensive science is to be developed. (Davis-Chicago)
W73-06925

AEROBIC DECOMPOSITION OF SEDIMENT AND DETRITUS AS A FUNCTION OF PARTICLE SURFACE AREA AND ORGANIC CONTENT,
Copenhagen Univ., Hillerod (Denmark). Freshwater-biological Lab.
B. T. Hargrave.
Limnology and Oceanography, Vol 17, No 4, p 583-596, July 1972. 7 fig, 2 tab, 47 ref.

Descriptors: *Aerobic conditions, *Microbial degradation, *Detritus, *Sediments, *Biochemical oxygen demand, *Chemical oxygen demand, *Decomposing organic matter, *Aquatic microorganisms, Mud, Sands, Snails, Absorption, Oxygen, Lake sediments, Oligochaetes, Diptera, Aquatic bacteria, Gastropods, Mollusks, Inhibition, Bioassay, Aquatic soils, Water sampling, Bottom sediments, Dissolved oxygen, Benthic fauna, Annelids, Aquatic insects.

Identifiers: *Feces, *Surface area, Organic carbon, Organic nitrogen, Macroinvertebrates, Recolonization, Macrophytes, Oxygen consumption, Fate of pollutants, Sample size, Lake Esrom, Frederiksborg Castle Lake, Store Grib Lake, Grane Lang Lake, Limnaca palustris, Phragmites comminis, Chironomus anthracinus, Ilyodrilus hammoniensis, Plate counts.

Oxygen uptake by microbial populations on mud, sand, and various types of detritus was measured in short-term experiments in aerated water at 20C. Sample size had no effect on oxygen consumption per unit weight, but stirring increased uptake. A 2 percent Formalin solution completely stopped biological uptake of oxygen by microorganisms on sand and detritus; lake muds showed various degrees of chemical uptake of oxygen. Microorganisms on dead Pragmites leaves consumed oxygen at an increasing rate during the first few days of decomposition, followed by a decline to a rate comparable to uptake by freshly collected detritus. Limnaea feces initially consumed oxygen three times more rapidly than detritus, but after 5 days rates were equal. Detritus consumed up to three orders of magnitude more oxygen per dry weight than sand; uptake rates were inversely related to particle diameter. The logarithm of oxygen uptake was directly related to the logarithm of particle organic content. Particulate oxygen uptake in this and previous studies fell between 0.1 and 10 mg 02/(g organic matter)/hr, a rate inversely related to particle diameter. Oxygen uptake per unit weight by particles of ashed mud and sand exposed for 24 hr to decomposing detrius in a nutrient solution and transferred to fresh solution was inversely related to particle size and similar to rates measured with freshly collected samples. On an areal basis all particles consumed between 0.01 and 1 microgram 02/cm/hr. The negative linear correlation on logarithmic axes of surface area, organic carbon and nitrogen and bacterial plate counts with sediment particle size is similar to that observed for measures of oxygen uptake. Bacteria cover only a few percent of particle surfaces. This may result in the narrow range of measures of microbial community respiration on an areal basis. (Holoman-Battelle)
W73-06932

OXYGEN CONSUMPTION BY THE SEABED. VI. SEASONAL CYCLE OF CHEMICAL OXIDATION AND RESPIRATION IN PUGET SOUND,
Washington Univ., Seattle. Dept. of Oceanography.
M. M. Pamatmat.
Internationale Revue der Gesamten Hydrobiologic, Vol 56, No 5, p 769-793, 1971. 13 fig, 6 tab, 16 ref.

Descriptors: *On-site data collections, *Respiration, *Seasonal, *Cycles, *Bottom sediments, *Hypolimnion, *Sea water, Currents (Water), Absorption, Water temperature, Organic matter, Dissolved oxygen, Benthos, Metabolism, Anaerobic conditions, Oxygen requirements, Tides, Sampling, Corea, Methodology, Soil analysis, Chemical analysis, Sands, Silts, Salinity, Statistical methods, Computer programs, Measurement.
Identifiers: *Shipboard measurements, *Chemical oxidation, *Puget Sound, Sample preservation, Sample preparation, Iodometry, Organic carbon, Organic nitrogen, Variance.

The most convincing and most definite information about benthic oxygen consumption in Puget Sound includes: (1) the significant differences between stations, and (2) the seasonal cycle of oxygen consumption (total uptake, chemical oxidation, and respiration) which is independent of seasonal temperature fluctuations. The temperature cycle enhances the seasonal cycle of oxygen uptake - highest in July decreasing through October to a low in January and increasing from January through April to a high in July. The differences between stations were unsuccessfully attributed to any environmental parameter. However, there is better evidence that one overwhelming factor showing up as a variable in attempted correlations between rates and organic matter concentration is the flux of organic matter to the sediment. The indications are a smaller flux, or a flux of less readily oxidized organic matter, during the winter than the summer; and a larger flux, or a flux of more easily oxidized organic matter, at shallow-water stations than at deep-water stations. An iodometric method for determining the concentration of reduced substances in the sediment showed a linear increase in the concentration with the logarithm of depth of the sediment layer, and a trend of decreasing concentrations with increasing depth of the station. The rate of chemical oxidation is significantly correlated with the concentration of reduced substances. The seasonal cycle in chemical oxidation may signify a close relationship between anaerobic metabolism and chemical oxidation. The estimated annual oxygen consumption at 23 stations ranges from 56 to 185 liters/sq m for total uptake, 34 to 106 for chemical oxidation, and 13 to 101 for respiration. (Holoman-Battelle)
W73-06933

WATER POLLUTION POTENTIAL OF SNOWFALL ON SPENT OIL SHALE RESIDUES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. C. Ward, and S. E. Reinecke.
Available from the National Technical Information Service as PB-210 930, $3.00 in paper copy, $0.95 in microfiche. Bureau of Mines Open File Report 20-72, June 1972. 62 p, 11 fig, 9 tab, 4 ref, 3 append. Grant No. G0111280.

Descriptors: *Water pollution sources, *Oil shales, *Industrial wastes, *Model studies, *Rain, *Dissolved solids, *Hydrogen ion concentration, *Mathematical models, Snow, Sodium, Calcium, Magnesium, Bicarbonates, Sulfates, Potassium, Chlorides, Runoff, Rainfall-runoff relationships, Leaching, Oil wastes, Equations, Meltwater, Precipitation (Atmospheric), Ions, Path of pollutants.

Because of the pollution potential of runoff from spent shale resulting from oil recovery by the TOSCO II process, a study was designed to simulate processes that might occur under natural conditions. A model system consisted of a shale waste piled on sand underlayed with plastic sheet to prevent loss of drainage. A perforated plastic pipe was placed in the sand to collect the drainage and divert it to a drum for storage and later analysis. To simulate atmospheric conditions, artificial snow was blown onto the spent shale and allowed to melt. Analysis of the runoff water showed that the Na (plus), Ca (2 plus), Mg (2 plus), HCO3 (minus), and SO4 (2 minus) were the most common ions present after contact with spent shale. H (plus), K (plus), and Cl (minus) were also determined in the samples. In addition, an empirical equation was developed to predict the concentration of the runoff water as a function of independent parameters. A tendency for saturation of the residue to occur during a period of snowmelt was revealed. The effects of this saturation on the residue were also considered. An overland flow water quality model was developed and successfully applied to runoff resulting from rainfall and snowfall on oil shale retorting residue. The surface water runoff from snowfall on oil shale residue has less water pollution potential than the runoff from rainfall. The concentration of dissolved solids in the runoff was a function of the cumulative volume of runoff per unit width, the porosity of the oil shale retorting residue, the soil moisture content, the snowmelt rate, and the fraction of the snowmelt water that is runoff. (Little-Battelle)
W73-06934

SOME ASPECTS OF POLLUTION IN SOUTHAMPTON WATER,
Southampton Univ. (England). Dept. of Oceanography.
J. E. G. Raymont.
Proceedings of the Royal Society of London, Series B, Vol 180, No 1061, p 451-468, March 21, 1972. 8 fig, 3 tab, 25 ref.

Descriptors: *Trace elements, *Heavy metals, *Water pollution, *Water pollution sources, Nutrients, Clams, Organic matter, Water pollution effects, Turbulence, Rivers, Thermal pollution, Effluents, Phytoplankton, Estuaries, Industrial wastes, Urbanization, Mollusks, Zinc, Copper, Iron, Nickel, Mercury, Phosphorus, Nitrogen compounds, Amino acids, Sediments, Nitrates, Ammonium compounds.
Identifiers: *Southampton, Biological magnification, Mercenaria mercenaria, Mytilus adulis, Cardium edule, Elminius modestus, Particulate matter, England, Water.

The following topics, as related to pollution, were discussed: (1) trace metals, (2) nutrients, (3) dissolved and particulate organic matter, and (4) thermal effects. From previous works it has been shown that the concentration of particulate iron depended significantly upon the total particulate matter of the area. Zn, Cu, and Ni variations appear to be correlated with local industrial pollution. Fe, Zn, Cu, and Hg were magnified by the bivalves Mercenaria mercenaris, Cerdium edule and Mytilus edulis. A relationship between turbulence and metal concentration appears extant, since higher concentrations of metals were present in mussels from turbulent areas that from clear waters. Such a factor will be important on studies of pollution of estuaries, since it suggests that tract elements in sediments may be stirred into suspension. Nutrient levels in this Southampton area have risen such that further increases might have deleterious effects. Thermal changes appear to have no harmful effects other than propagating growth of certain species in lieu of others (Elminius modestus). The degree of variability between particulate and dissolved organics was associated with turbulence and effluent concentrations, and varied according to the degree of industrialization and urbanization along the water-way. (Mackan-Battelle)
W73-06942

INFLUENCE OF SUMMER USE OF A MOUNTAIN WATERSHED ON BACTERIAL WATER QUALITY,
Wyoming Univ., Laramie.
Q. D. Skinner, J. C. Adams, and P. A. Rechard.
Proc. available from Americal Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017.Price $10.00. In: Age of Changing Priorities for Land and Water, Proceedings of Irrigation and Drainage Division Specialty Conference, Sept 26-28, 1972, Spokane Wash: New York, N.Y. American Society of Civil Engineers, p 57-77, 1972. 8 fig, 1 plate, 2 tab, 9 ref.

Descriptors: *Water pollution sources, *Water pollution effects, *Path of pollutants, Recreation, Wyoming, Camping, Skiing, Coliforms, Demonstration watersheds.

In mountain streams affected by human activities, the concentration of total coliforms, fecal coliforms and enterococci increased with the amount of snowmelt until near the peak of the hydrograph, decreased for a period of time, then increased during the late summer, and finally fell again in autumn. In contrast, peak counts of fecal coliforms occurred in the winter in a natural area. The Nash Fork Watershed Study area, maintained by the Wyoming Water Research Institute, encompasses 4,631 acres and has an elevation ranging from 9,100 to 11,722 feet. The effect of land use does not appear to be large. The concentration of fecal coliforms did not exceed 200 per ml and

usually the count was less than 20 per 100 ml. The main source of pollution appears to be due to animals rather than to humans. (Knapp-USGS)
W73-06945

THE DISTRIBUTION OF MERCURY IN THE SURFICIAL SEDIMENTS OF LAKE HURON,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
R. L. Thomas.
Canadian Journal of Earth Sciences, Vol 10, No 2, p 194-204, February 1973. 5 fig, 2 tab, 12 ref.

Descriptors: *Mercury, *Lake Huron, *Path of pollutants, *Distribution patterns, Water circulation, Bottom sediments, Trace elements, Weathering, Great Lakes.

Total mercury was determined in 163 samples of the topmost 3 cm of sediment taken from Lake Huron during 1969. Total mercury values range from 54 to 805 ppb with a mean of 222 ppb and a standard deviation of 162 ppb. The mercury distribution in the lake sediments shows a trend for increasing concentration from nearshore and midlake shallow water, coarse sediment deposits outwards into the fine-grained sediments in the deeper water basins. The application of a quartz correction to compensate for the dilution by an inert constituent reveals two major anomalies of higher mercury concentration. The Saginaw anomaly occurs in the southern basins of the lake and is believed to be due to the input of industrial mercury from Saginaw Bay; the Bruce anomaly inthe northeastern part of Manitoulin basin is believed to be due to the weathering of sulfide with subsequent concentration in the lake sediments being related to major water circulation patterns in the lake. Statistical analysis shows the mercury to be bound in the sediments predominantly adsorbed or complexed by organic matter with subsidiary adsorption by the surfaces of iron sulfides and hydrated iron oxide-inorganic phosphorus complexes. (See also W73-06956) (Knapp-USGS)
W73-06957

SEDIMENT DISCHARGED FROM CANADIAN BASINS INTO LAKE ONTARIO,
Queen's Univ., Kingston (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 02J.
W73-06958

EFFECT OF NONLINEAR STABILIZING SALINITY PROFILES ON THERMAL CONVECTION IN A POROUS MEDIUM LAYER,
Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02F.
W73-06969

MASS TRANSPORT IN FLOWING GROUNDWATER,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02F.
W73-06970

EFFECT OF INTRA-AGGREGATE DIFFUSION ON OSCILLATORY FLOW DISPERSION IN AGGREGATED MEDIA,
Agricultural Research Service, St. Paul, Minn. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 02G.
W73-06971

DYNAMIC SURFACE TEMPERATURE STRUCTURE OF THERMAL PLUMES,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
F. L. Scarpace, and T. Green, III.
Water Resources Research, Vol 9, No 1, p 138-153, February 1973. 22 fig, 1 tab, 11 ref.

Descriptors: *Water temperature, *Remote sensing, *Thermal pollution, Infrared radiation, Lakes, Path of pollutants, Winds, Mixing, Instrumentation.

Airborne thermal imagery was used to show that thermal plumes often vary rapidly in space and time, although both the initial thermal effluent and the receiving water change very little. The imagery was used with simultaneous data taken from boats. The rapid variations can cast doubt on the validity of some standard methods of measuring thermal plumes. The plume is sometimes dominated by a series of concentric thermal fronts that spread radially outward from the outfall. (Knapp-USGS)
W73-06976

LEACHING OF STRONTIUM-90 FROM SOIL BY SURFACE WATERS (VYMYVANIYE STRONTAIYA-90 IZ POCHVENNOGO POKROVA POVERKHNOSTNYMI VODAMI),
Institut Prikladnoi Geofiziki, Moscow (USSR).
For primary bibliographic entry see Field 02G.
W73-06981

LEACHING OF NITRATES IN DARK CHESTNUT SOIL OF ZAILISKI ALA TAU (O VYMYVANII NITRATOV V TEMNO-KASHTANOVOY POCHVE ZAILIYSKOGO ALATAU),
Kazakhskii Gosudarstvennyi Selskokhozyaistvennyi Institut, Alma-Ata (USSR).
For primary bibliographic entry see Field 02G.
W73-06982

TRANSVERSE DIFFUSION OF SOLUTES IN NATURAL STREAMS,
Geological Survey, Washington, D.C.
N. Yotsukura, and E. D. Cobb.
Available from GPO, Washington, D C 20402 Price 55 cents (paper cover). Professional Paper 582-C, 1972. 19 p, 14 fig, 6 tab, 19 ref.

Descriptors: *Water pollution, *Diffusion, *Streams, *Path of pollutants, Model studies, Steady flow, Equations, Theoretical analysis, Correlation analysis, Dispersion, Mixing, Streamflow, Testing procedures, Flow rates, Curves, On-site investigations.
Identifiers: Transverse diffusion.

An analytical model was developed for the transverse diffusion of solutes from steady sources placed in a natural stream with steady discharge. In theoretical derivations, the steady-state convective diffusion equation for a natural stream is converted into an approximate equation suitable for analytical treatment by the introduction of cumulative partial discharge as an independent variable. Analytical solutions for the latter equation are obtained for point and line source injections of solutes. The validity of the model was tested using data from four natural streams, three of which are alined straight, while one has mild curves. The verification was satisfactory for the three straight channels, and the constant in Elder's formula for the transverse diffusion coefficient ranged from 0.2 to 0.3. In the curved channel, the model appears workable, but an increase of the diffusion coefficient in the downstream direction is observed. The model may be employed for the description and prediction of thermal and other waste disposal problems, simulation studies by tracers, and the determination of transverse diffusion coefficient. (Woodard-USGS)
W73-07049

PORT ROYAL SOUND ENVIRONMENTAL STUDY.
South Carolina Water Resources Commission, Columbia.

November 1972. 555 p.

Descriptors: *Water resources, *Environment, *South Carolina, *Estuaries, Water resources development, Recreation, Economics, Political aspects, Environmental effects, Ecology, Water chemistry, Water pollution effects.
Identifiers: *Port Royal Sound (S C).

The Port Royal Sound Environmental Study evolved from the controversy concerning the proposed construction of a petrochemical plant in the vicinity of Port Royal Sound, S. C. The areas considered and investigated in this study included: surface water hydraulics, geology and groundwater hydrology, biology, water chemistry, air quality, solid waste and economic, sociological and political considerations. The study area lies within the Sea Island Section of the Coastal Plain province, which is a part of the Atlantic Plain. The Atlantic Plain consists of the emerged plain, or Coastal Plain and the submerged continental shelf. The Coastal Plain and the continental shelf have a combined width of about 200 miles and a southeastward gradient of about 3.6 feet per mile. The study area is drained principally by Port Royal Sound and its many tributaries. (See W73-07058 thru W73-07061) (Knapp-USGS)
W73-07057

MATHEMATICAL SIMULATION OF THE FLOW DYNAMICS AND CONSTITUENT TRANSPORT IN PORT ROYAL SOUND, SOUTH CAROLINA: AN INTERIM REPORT,
Geological Survey, Washington, D.C.
R. A. Baltzer.
In: Port Royal Sound Environmental Study, South Carolina Water Commission Publication, p 22-46, November 1972. 13 fig, 1 tab, 8 ref.

Descriptors: *Mathematical models, *Numerical analysis, *Estuaries, *South Carolina, Sreamflow, Path of pollutants, Water balance, Water chemistry, Currents (Water), Water quality, Environment, Ecology, Water resources development, Sediment transport, Sedimentation, Water circulation.
Identifiers: *Port Royal Sound (S C).

General purpose, mathematical/numerical models may be used to simulate the flow dynamics and constituent transport of well-mixed estuaries and coastal embayments. One of these models specifically represents Port Royal Sound, South Carolina. The vertically integrated equations for fluid continuity and momentum conservation, together with the vertically integrated mass-balance, constituent-transport equation are the basis for model development in the two-dimensional, areal sense. Constituent reaction terms are included in the transport equation. For the particular model being implemented in Port Royal Sound a finite-difference, implicit numerical process is used to achieve successive solutions with respect to time. The mathematical-numerical model of Port Royal Sound is intended to permit time-sequential simulation of the movement and concentration of nonconservative as well as conservative constituents injected into the embayment. Output from the model is in the form of graphical displays of the flow vector field and contoured constituent concentration patterns at successive time intervals throughout the modeled region. (See also W73-07057) (Knapp-USGS)
W73-07058

A TRACER SIMULATION STUDY OF POTENTIAL SOLUTE MOVEMENT IN PORT ROYAL SOUND,
Geological Survey, Washington, D.C.
F. A. Kilpatrick, and T. R. Cummings.

In: Port Royal Sound Environmental Study, South Carolina Water Resources Commission Publication, p 48-72, November 1972. 12 fig, 1 tab, 6 ref.

Descriptors: *Path of pollutants, *Tracers, *Dye releases, *Estuaries, *South Carolina, Water circulation, Streamflow, Tides, Currents (Water).
Identifiers: *Port Royal Sound (S C).

A tracer study was conducted in Port Royal Sound, South Carolina, to simulate the movement and ultimate pattern of concentration of a solute continuously injected into the flow. Rhodamine WT dye was injected by boat, during a period of 24 hours, in a line across the Colleton River. During the following 43 days, samples of water were taken at selected points in the Sound and the concentration of dye in the samples was determined by fluorometric analysis. Only minor concentrations may be expected along the beaches of Hilton Head Island. Most of the solute would be transported directly seaward because the dominant path of tidal flow is the deep main channel. Because a solute originating in the Colleton River would favor the right bank after entering the Chechessee River, medium concentration would be experienced in this region and in the northeastern portions of Skull and Mackay Creeks. Under normal conditions no significant amount of solute should pass through Skull and Mackay Creeks into Calibogue Sound. Medium concentration would exist in the upper Chechessee River, caused by the back-flushing of solute from the lower Chechessee River at flood tides. (See also W73-07057) (Knapp-USGS)
W73-07059

POTENTIAL FOR GROUNDWATER DEVELOPMENT,
Geological Survey, Columbia, S.C.
R. A. Gardner.
In: Port Royal Sound Environmental Study, South Carolina Water Resources Commission Publication, p 108-109, November 1972. 8 ref.

Descriptors: *Hydrogeology, *Aquifers, *South Carolina, *Water resources development, Aquifer testing, Drawdown, Water yield, Transmissivity, Permeability, Groundwater resources.
Identifiers: *Port Royal Sound (S C).

The only potable fresh water naturally occurring in the area immediately surrounding Port Royal Sound, S.C., is groundwater. The principal water-bearing zone is the upper part of the Eocene limestone. The top of this limestone ranges from 50 to 100 feet in depth in the Port Royal Sound area. A test well at the proposed industrial plant site at Victoria Bluff produced about 2,900 gallons per minute for a period of 1 week, with a drawdown of about 20 feet. This well, which had the largest yield of any well in South Carolina, demonstrates that the principal water-bearing zone in this area has a great potential for supplying water. Generally, this zone is overlain by a cap of lower permeability that prevents the direct entry of salt water into the water-bearing zone under the present conditions of small local withdrawals. However, since the top of the water-bearing zone is above the bottom of parts of Port Royal Sound, Calibogue Sound, and other bodies of salt water, at places the potential exists for intrusion of salt water, if the fresh-water head is lowered. In addition to the principal water-bearing zone in the limestone, shallower zones (less than 100 feet in depth) provide small quantities of water in some areas. (See also W73-07057) (Knapp-USGS)
W73-07060

WATER QUALITY EVALUATION PHYSICAL AND CHEMICAL,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
R. K. Ballentine.
In: Port Royal Sound Environmental Study, South Carolina Water Resources Commission Publication, p 112-172, November 1972. 12 fig, 7 tab, 5 ref.

Descriptors: *Water quality, *Estuaries, *South Carolina, Oxygen demand, Water pollution, Dissolved oxygen, Water pollution sources.
Identifiers: *Port Royal Sound (S C).

As part of the Port Royal Sound Environmental Study (S. C.), the Environmental Protection Agency participated in physical, chemical, and other related investigations. Three intensive physical and chemical studies were performed on Port Royal Sound. Port Royal Sound and its tributaries (excluding the Beaufort River and its tributaries which are classified as SB) were classified by the South Carolina Pollution Control Authority as class SA, which denotes salt, 'waters suitable for shellfishing for market purposes and and other usages.' Two principal sources of waste are discharged to the Beaufort River which is hydraulically connected to Port Royal Sound. These are the treated wastes from the U.S. Marine Corps facility on Parris Island (1 million gallons per day receiving secondary treatment) and the untreated municipal wastes from the city of Beaufort (population 10,350). The chemical quality of the waters of Port Royal Sound was generally excellent and indicative of high quality water. Dissolved oxygen concentrations in the Colleton River dropped below the 5.0 mg/liter South Carolina standard during July 1970, without the influence of man-caused pollution. The primary source of oxygen-demanding material was from the peripheral marshes. Phytoplankton do not constitute a nuisance in Port Royal Sound. (See also W73-07057) (Knapp-USGS)
W73-07061

THE DISTRIBUTION OF DISSOLVED ORGANIC MATTER IN THE NEAR-SHORE WATERS OF THE TEXAS COAST,
Texas Univ., Port Aransas. Inst. of Marine Science.
L. G. Maurer, and P. L. Parker.
Contributions in Marine Science, Vol 16, p 109-124, March 1972. 10 fig, 4 tab, 11 ref.

Descriptors: *Path of Pollutants, *Spatial distribution, *Texas, Estuaries, Sea water, Pollutant identification, Depth, Gulf of Mexico, Water sampling, Filtration, Efficiencies, Organic compounds, Water analysis, Chemical analysis, Equipment, Methodology, Gas chromatography, Colorado River, Salinity, Carbohydrates.
Identifiers: *Dissolved organic matter, *Coastal waters, *Dissolved organic carbon, Thermal conductivity gas chromatography, Sample preparation, Persulfate oxidation, Chemical recovery, Van Dorn sampler, Bovine serum albumin, Laguna Madre, Corpus Christi Bay, Baffin Bay, Aransas Bay, Copano Bay, Lavaca Bay, Matagorda Bay, San Antonio Bay, Lactose, Starch, Guanosine, Potassium acid phthalate.

Since the concentration of dissolved organic matter (DOM) of self waters in the Gulf of Mexico has been reported to range between 0.58 and 2.35 mg C/liter for 79 samples, a study was made to establish the fine structure of these concentration ranges for the shelf off the Texas Coast. Gulf of Mexico samples were taken from 2-5 meters below the surface with one-or two-liter Van Dorn samplers, and then immediately suction filtered through Gelman type 'A' glass fiber filter pads. Salinities were measured in the field using a temperature-compensated Goldberg refractometer. Clean polyethylene bottles rinsed several times with the filtered sample were used to store the samples which were kept frozen until analyzed. Samples from the Laguna Madre and Corpus Christi Bay were collected similarly. Other estuarine samples were taken from the surface in a bucket and refrigerated in the polyethylene bottles and filtered on return to the laboratory, usually within 12 hours after collection. A modification of the persulfate method of Wilson (1961) as improved by Menzel and Vaccaro (1964) was used to measure the DOC. However, a gas chromatograph was used rather than an IR detector to measure the CO_2 formed. Several types of standards were used to check the reliability of various parts of the analytical procedure. Various compounds in water solution was tested to check the efficiency of the oxidation and recovery from samples. Zones of high and low concentration were found on the shelf. The concentrations in the estuaries (2-5.3 mg/l) were higher than those for shelf waters (1-3.7). (Holoman-Battelle)
W73-07066

OCCURRENCE AND TYPES OF THIOBACILLUS-LIKE BACTERIA IN THE SEA,
Woods Hole Oceanographic Institution, Mass.
J. H. Tuttle, and H. W. Jannasch.
Limnology and Oceanography, Vol 17, No 4, p 532-543, July 1972. 2 fig, 8 tab, 21 ref.

Descriptors: *Marine bacteria, *Ecological distribution, *Pollutant identification, *Sulfur bacteria, *Nutrient requirements, Sulfides, Water sampling, Cultures, Sodium chloride, Sulfur, Bottom sediments, Atlantic Ocean, Isolation, Anaerobic conditions, Oxidation, Chemical reactions, Hydrogen ion concentration, Aerobic bacteria.
Identifiers: *Thiobacillus, Enrichment, Thiosulfates, Substrate utilization, Autotrophic bacteria, Heterotrophic nutrition, Bacterial physiology, Chemolithotrophy, Black sea, Culture media, Marine environment, Substrates, Growth media, Microbial oxidation.

Offshore waters and sediments of the Atlantic Ocean and the Black Sea and inshore waters near Woods Hole, Massachusetts, were examined for bacteria resembling Thiobacillus sp., and 136 isolates were obtained by enrichment culture with thiosulfate or elemental sulfur as the energy source. Enrichments for iron-oxidizing thiobacilli were unsuccessful. Under chemolithotrophic growth conditions, only 19 percent of the isolates oxidized more than 5 percent of the thiosulfate supplied in mineral medium, with an increase, moderate decrease, or no change in the pH of the medium. Strains that decreased the pH were proportionately most abundant in inshore water. Thirty-five percent of the isolates could be cultured on sulfide substrate with a greater yield than on thiosulfate. Seventy-four percent of the isolates could grow anoxically in thiosulfate mineral medium containing nitrate as the terminal acceptor; only 3 of these produced gas from nitrate. About 95 percent of all isolates could be grown on organic media. Heterotrophically grown cultures could easily be grown on thiosulfate mineral medium when transferred from organic medium. Apparently the 'typical' obligately chemoautotrophic thiobacilli are rare in the marine environment and biological oxidation of reduced sulfur compounds in open ocean areas is largely carried out by facultatively autotrophic bacteria. (Holoman-Battelle)
W73-07067

A STUDY OF THE DISTRIBUTION AND ACTIVITY OF MICROORGANISMS IN OCEAN WATER,
North Carolina State Univ., Raleigh. Dept. of Zoology.
J. E. Hobbie, O. Holm-Hansen, T. T. Packard, L. R. Pomeroy, and R. W. Sheldon.
Limnology and Oceanography, Vol 17, No 4, p 544-555, July 1972. 1 fig, 5 tab, 44 ref.

Descriptors: *Marine microorganisms, *Sea water, *Ecological distribution, *Respiration, *Biomass, *Metabolism, *Photosynthesis, Phytoplankton, Marine bacteria, Marine algae, Chlorophyll, Water analysis, Hydrography, Zooplankton, Protozoa, Marine fungi, Cultures, Water sampling, Oxygen, Plant pigments, Assay, Radioactivity techniques, Water temperature, Salinity, Secchi disks, Absorption, Organic matter, Algae, Bacteria, Microorganisms, Microbiology.

Identifiers: Adenosine triphosphate, Pheophytin, Organic carbon, Particulate matter, Electronic transport, Heterotrophic nutrition, Culture media, Sargasso Sea, Substrate utilization, Phase contrast microscopy, Luciferin-luciferase enzyme, Oxygen electrode, Nansen bottle, Sample preparation, Membrane filters, Sample preservation, DNA, Glucose, Aspartic acid, Proline, ATP, Heterotrophy.

Estimates of living mass and respiratory rate were made by several methods on large water samples taken at several depths at each of two ocean stations. Total microbial biomass estimates based on ATP determinations gave reasonable results in relation to phytoplankton biomass, total particulate organic carbon, and total particulate volume as determined by an electronic particle counter. Respiratory rate estimates based on O2 uptake, electron transport system activity, and ATP were in moderately good agreement in surface water but diverged widely in deep water. Heterotrophic uptake of specific organic compounds seems to be related to numbers of active bacteria and not related to total microbial respiration. Photosynthetic rates of release of dissolved photosynthate are reported for both stations. (Holoman-Battelle)
W73-07068

INTERACTION OF SALINITY AND TEMPERATURE ON NET PROTEIN SYNTHESIS AND VIABILITY OF VIBRIO MARINUS,
Oregon State Univ., Corvallis. Dept. of Microbiology; and Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W73-07069

SURFACE CONCENTRATION OF MARINE BACTERIA,
Scripps Institution of Oceanography, La Jolla, Calif.
H. F. Bezdek, and A. F. Carlucci.
Limnology and Oceanography, Vol 17, No 4, p 566-569, July 1972. 1 fig, 1 tab, 9 ref.

Descriptors: *Marine bacteria, *Model studies, *Sea water, *Monomolecular films, Aerobic bacteria, Surface waters, Water sampling, Methodology, Spectrophotometry, Density.
Identifiers: *Serratia marinorubra, *Bulk density, Pure cultures, Liquid-gas interface.

An investigation has been made of the concentration of a pure culture of a marine bacterium in drops of seawater that are thought to sample the surface microlayer. The drops formed from a single gas bubble bursting at a liquid-gas interface were used as a technique to sample the surface microlayers, and concentration factors for the drops were determined for the marine bacterium Serratia marinorubra. These factors, varying between 2 and 100, depended on the bulk densities of the bacteria. A model was presented that relates bacterial bulk densities to bacterial densities in a microlayer at the surface. Preliminary experiments with natural seawater populations revealed that concentration factors were markedly higher than those for S. marinorubra. (Holoman-Battelle)
W73-07070

DISSOLVED ORGANIC CARBON UTILIZATION IN SIZE-FRACTIONATED ALGAL AND BACTERIAL COMMUNITIES,
Dartmouth Coll., Hanover, N.H. Dept. of Biological Sciences.
H. L. Allen.
Internationale Revue der Gesamten Hydrobiologie, Vol 56, No 5, p 731-749, 1971. 1 fig, 10 tab, 48 ref.

Descriptors: *Phytoplankton, *Aquatic bacteria, *Aquatic algae, *Absorption, *Organic compounds, Biomass, Kinetics, Diffusion, Membrane processes, Carbon cycle, Competition, Biological communities, Epiphytology, Nannoplankton, Chlorophyta, Chrysophyta, Euglenophyta, Pyrrophyta, Cyanophyta, Systematics, Absorption. Radioactivity techniques, Surface waters, Carbon, Freshwater, Diatoms, Chlamydomonas.
Identifiers: *Glucose, *Bacterioplankton, *Substrate utilization, Dissolved organic cargon, Star Lake, *Acetates, Substrate concentration, Membrane filters, Sample preparation, Active transport, Substrates, Flagellates, Ankistrodesmus falcatus, Scenedesmus bicellularis, Chrysococcus, Mallomonas, Phacus longicauda, Phacus pleuronectes, Saplinglea, Cyclotella, Synedra acua var. angustissima, Euglena acus, Euglena proxima, Trachelomonas hispida, Trachelomonas volvocina, Peridinium bipes, Cryptomonas ovata, Cryptomonas reflexa, Anabaena solitaria.

Uptake of glucose and acetate-C-14 by freshwater planktonic algae and bacteria has been measured in size-fractionated samples from the surface waters of a small pond over a three-month period. The reduction in algal biomass by filtration through a 20-micron and a 58-micron net was related closely to decreases in the diffusion constant K sub d, a parameter describing uptake by algal organisms. Uptake due to active transport, operating at low substrate concentrations and attributed to the bacteria of the plankton, was only slightly affected by filtration through a 58-micron net; velocities of active uptake were significantly reduced by filtration through a 20-micron net. A single photoplankton sample was collected from a second lake and size-fractionated by filtration through a series of nine membrane filters of different porosities ranging from 14.0 microns down to 0.22 micron. The reduction of the maximum velocity of active transport, following size-fractionation, revealed that organisms between 3 and 8 microns were responsible for the majority of the active uptake of glucose and acetate, and that microorganisms of bacterial size-categories, i.e., less than 1.2 microns, assumed only a minor role in the uptake process. Algal organisms in the natural control sample were predominantly small microflagellates with mean dimensions between 4 and 8 microns; few bacteria were noted. Rates of diffusion, at considerably higher substrate levels, were extremely low by comparison of those few data available from the literature. Diffusion could not be detected in samples which had been filtered through 5-micron porosity membrane filters. An epiphytic algal and bacterial sample, collected from a known surface area on the petiole of Nymphaea odorata, was size-fractionated through a series of membrane filters with pore sizes between 8.0 and 0.22 microns. Active transport and diffusion measurements of the utilization of glucose and acetate showed that (1) diffusion uptake was limited to organisms greater than 5 microns in mean dimensions, and (2) differential reduction in active transport by filtration suggested that different epiphytic organisms were utilizing each of the two organic substrates tested. Bacterial size-categories (0.45 to 1.2 microns) were responsible for greater than 60 percent of the total community first-order active transport uptake. (Holoman-Battelle)
W73-07072

THE DISTRIBUTION AND ECOLOGY OF THE INTERSTITIAL MEIOFAUNA OF A SANDY BEACH AT WHITESAND BAY, EAST CORNWALL,
Marine Biological Association of the United Kingdom, Plymouth (England). Lab.
R. P. Harris.
Journal of the Marine Biological Association of the United Kingdom, Vol 52, No 1, p 1-18, February 1972. 11 fig, 3 tab, 41 ref.

Descriptors: *Sands, *Beaches, *Ecological distribution, *Earth-water interfaces, Nematodes, Copepods, Depth, Water temperature, Sea water, Saline water, Bioindicators, Pollutant identification, Salinity, Invertebrates, Marine animals, Water sampling, Crustaceans.
Identifiers: *Whitsand Bay, Turbellaria, Gastrotrichs, Tardigrades, Rydroids, Coelenterates, Species density, Hydrozoa, Halammohydra, Pseudostomella roacovita, Batillipes Phreaticus, Flatworms, Platyhelminthes.

The interstitial meiofauna was investigated on an exposed sand beach at Whitsand Bay, Cornwall. An intertidal transect of eight stations was sampled regularly over a period of 2 years from May 1968 to May 1970. Quantitative core samples were taken to a depth of 5 cm. Nematodes were the dominant group on the beach, forming about 50 percent of the meiofauna. Harpacticoid copepods were second in overall abundance. Hydrozoa, turbellaria, gastrotrichs and tardigrades were also present. The mean annual meiofauna density of M.L.W.N. was 394/10 sq cm. There was little evidence of distinct horizontal zonation of the meiofauna on the beach. The meiofauna was concentrated in the surface layers of the sand in summer and was found down to depths of 50 cm in winter. Distinct vertical zonation patterns characteristic of the major meiofauna groups were observed. The factors affecting the distribution on the beach are considered. Temperature variation at the sand surface, and at the upper beach levels, is probably one of the major factors limiting zonation of the fauna. The meiofauna of the beach is compared with that of other sandy beaches in Europe. In general, densities are higher than those recorded in other areas. The composition of the fauna is similar to that described for French beaches, where environmental conditions were not comparable. (Byrd-Battelle)
W73-07073

FACTORS AFFECTING RESPIRATION RATES OF WINTER FLOUNDER (PSEUDOFLHURONECTES AMERICANUS),
National Marine Water Quality Lab., West Kingston, R. I.
For primary bibliographic entry see Field 05C.
W73-07074

GROWTH OF YEASTS ON HYDROCARBONS AT 37 DEGREES,
Regional Research Lab., Jorhat (India).
B. K. Lonsane, H. D. Singh, K. Vadalkar, B. A. Barua, and J. N. Baruah.
Journal of General and Applied Microbiology, Vol 17, No 6, p 499-507, December 1971. 4 fig, 3 tab, 16 ref.

Descriptors: *Yeasts, *Temperature, *Proteins, *Amino acids, Isolation, Biomass, Chemical analysis, Fungi, Cultures, Solvent extractions, Organic acids, Organic compounds, Analytical techniques.
Identifiers: *Hydrocarbons, *Growth media, *n-alkanes, *Substrate utilization, *Petroleum products, Saccharomyces chevalieri, Saccharomyces uvarum, Saccharomyces marxianus, Endomycopsis fibuliger, Biochemical characteristics, Fate of pollutants, Sample preparation, Culture media, White kerosens, Diesel oil, Gas oil, Dodecane, Tridecane, Tetradecane, Pentadecane, Decane, Undecane, Aliphatic hydrocarbons, Threonine, Lysine, Methionine, Valine, Isoleucine, Phemylalanine, Histidine, Arginine.

Seven yeast strains were isolated by an enrichment culture technique at 37 degrees from oil-soaked soil and silt samples. Two strains were of Endomycopsis fibuliger, 3 of Saccharomyces chevalieri, 1 of S. uvarum, and 1 of S. marxianus. Growth rates of the yeast cultures were studied in shake-flasks at 30,33,37, and 40 degrees and their dry biomass measured at intervals. The yeast strains were also studied for comparative utilization of gas oil, diesel oil, and white kerosene at 37 degrees with the dry biomass being determined and compared at 48 hr incubation. Four of the

strains which grew best at 37 degrees were studied for specificity towards members of the n-alkane series from decane to eicosane. Dry biomass obtained after 48 hr cultivation was compared. Dry biomass preparation was obtained by solvent extraction; the crude protein content was estimated by semimicro kjeldahl method; and the amino acid composition was analyzed by microbiological methods. Tests for the assimilation of nitrate, splitting of urbutin, production of carotenoid pigments, starch-like compounds, and esters, and splitting of fat were negative with all the strains. At 37 degrees, all the strains showed the highest growth rate. For the utilization of three petroleum fractions, gas oil seems to have been utilized better than diesel oil or white kerosene. Shorter-chain alkanes, decane and undecane, gave a very good biomass formation with all the strains but dodecane, tridecane, tetradecane, and pentadecane were, in general, poorly utilized. Protein content was rather low in four of the strains studied, the range being 37-38 percent. Among the strains which showed sustained growth at 37 degrees, only one had reasonably good protein content of 49 percent. Essential amino acid content of the protein was also rather poor in comparison to the FAO pattern with the exception of lysine. (Holoman-Battelle)
W73-07075

SAPROBIC SEQUENCE WITHIN THE GENUS VORTICELLA,
Vysoka Skola Chemicko-Technologicka, Prague (Czechoslovakia).
V. Sladecek.
Water Research, Vol 5, p 1135-1140, December 1971. 3 fig, 1 tab, 24 ref.

Descriptors: *Protozoa, *Systematics, Aquatic animals, Classification, Distribution patterns, Invertebrates.
Identifiers: *Ecological valencies, *Vorticella, *Saprobic index, Diliates.

A saprobic sequence was determined for 32 species of genus Vorticella (Protozoa, Ciliata) where each species was classified by saprobic valency and by saprobic index. Individual saproforms were diagrammed in two groups; those that were clean water types and those that were pollution types. All the saprobiologically classified Vorticella found in Czechoslovakia, Germany, Hungary, and Great Britain were listed. (Long-Battelle)
W73-07078

STUDIES ON PIGMENTED MICROORGANISMS FROM APHOTIC MARINE ENVIRONMENTS. II. NORTH ATLANTIC DISTRIBUTION,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
R. O. Fournier.
Limnology and Oceanography, Vol. 16, No. 6, p 952-961, November 1971. 6 fig, 3 tab, 27 ref.

Descriptors: *Pigments, *Microorganisms, *Aphotic zone, *Atlantic Ocean, *Ecological distribution, Phytoplankton, Carbon, Zooplankton, Depth, Sea water, Bioindicators, Pollutant identification, Limiting factors, Trophic level, Microscopy, Settling velocity, Predation, Food chains, Water sampling, Surface waters, Productivity.
Identifiers: *Marine environment, Vertical distribution, Mediterranean Sea, Particulate organic matter.

The distribution, the mechanisms controlling this distribution, and the deep food chain role played by pigmented microorganisms from aphotic marine environments in the North Atlantic were studied. Samples collected on three cruises in the North Atlantic Ocean and Mediterranean Sea indicate the existence of regional differences in the so-called 'olive-green cells', visible throughout most of the 5,000-m water column, which appear to be related to euphotic phytoplankton activities. Despite the observed regionality in cell concentrations the mean vertical pattern of distribution for each cruise is identical. Microscopic observations and settling rate calculations suggest that clumping of cells may be an important mechanism aiding the vertical transport of these microorganisms through the water column. Average estimates of the carbon represented by these cells yielded a range of 0.59-0.05 microgram C/liter, which accounted for about 10 percent of the total particulate organic carbon present at 400 and 4,800 m, respectively. However small these variations, they clearly demonstrate the variability in deep water of at least one component of the total particulate organic carbon pool. Microzooplankton are suggested as the most likely predators on these cells, which average 3.5-microns diameter. Since the standing stock of olive-green cells is exceedingly small, any assessment of their importance as a nutritional source in deep water is intimately related with estimates of their renewal rate. (Byrd-Battelle)
W73-07081

RESISTANCE, TAXONOMIC POSITION, AND PROTEIN CONTENT OF SOME TROPICAL MARINE ALGAE, (RESISTENZ, TAXONOMISCHE ZUGEHORIGKEIT UND PROTEINGEHALT EINIGER TROPISCHER MEERESALGEN),
Deutsche Akademie der Wissenschaften zu Berlin (East Germany).
For primary bibliographic entry see Field 05C.
W73-07083

PHOSPHORUS CYCLING IN AN EELGRASS (ZOSTERA MARINA L.) ECOSYSTEM,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W73-07099

A SIMPLE CHEMICALLY, DEFINED MEDIUM FOR THE GROWTH OF APHANOMYCES EUTEICHES AND SOME OTHER COMYCETES,
Kentucky Univ., Lexington. Dept. of Plant Pathology.
For primary bibliographic entry see Field 05C.
W73-07103

INDUSTRIAL WASTES. MEAT-, FISH-, AND POULTRY-PROCESSING WASTES,
Battelle Memorial Inst., Columbus, Ohio.
J. H. Litchfield.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1033-1037, June 1972. 28 ref.

Descriptors: *Poultry, *Fish, *Food processing industry, *Effluents, *Waste treatment, *Reviews, Industrial wastes, Water pollution sources, Chemical properties, Chemical oxygen demand, Biochemical oxygen demand, Proteins, Waste disposal, Shellfish, Anaerobic digestion, Oxidation lagoons, Suspended solids, Methodology, Cattle, Sheep, Hogs.
Identifiers: *Meat-packing industry, *Characterization, Slaughterhouse wastes, Recovery, Paunch, Grease, Blood.

A review is presented of the literature on the treatment and characterization of meat-, fish-, and poultry-processing wastes. (Holoman-Battelle)
W73-07106

AGRICULTURAL WASTES,
Oregon State Univ., Corvallis.
J. R. Miner.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1072-1078, June 1972. 40 ref.

Descriptors: *Farm wastes, *Animal wastes (Wildlife), *Water pollution sources, *Waste treatment, *Reviews, Enteric bacteria, Waste disposal, Degradation (Decomposition), Domestic animals, Agricultural runoff, Feedlots, Fertilizers, Pollutant identification, Livestock, Coliforms, Salmonella, Poultry, Gas chromatography, Methodology, Odor, Pathogenic bacteria, Sulfur bacteris, Chelation, Hogs, Biodegradation, Anaerobic digestion, Farm lagoons, Cattle, Ruminants, Recycling.
Identifiers: *Chemical composition, Biochemical characteristics, Feces, Enterococci, Serotypes, Thiorhodaceae, Chemical treatment.

This review article on agricultural wastes cover the following areas of interest: (1) animal wastes as a source of pollution, (2) characteristics and chemical composition of animal wastes, (3) cattle feedlots and runoff problems, (4) use of animal wastes as fertilizer, (5) gas and odor production, (6) animal waste treatment techniques, and (7) reuse of animal manures. (Holoman-Battelle)
W73-07107

MECHANICAL AND PHYSICAL ASPECTS OF WATER POLLUTION BY OIL SPILLAGE,
Battelle-Northwest, Richland, Wash.
For primary bibliographic entry see Field 05G.
W73-07108

TRANSFER OF CESIUM-137 FROM FISH TO THE PREPARED DISH DURING COOKING (IN RUSSIAN),
Ministerstvo Zdravookhraneniya SSSR, Moscow. Institut Biofiziki.
A. G. Pakulo.
Gig Sanit. Vol 36, No 10, p 49-51. 1971.
Identifiers: *Path of pollutants, Public health, Food chains, Carp, *Cesium-137, Cooking, Fish.

Carp yearlings were placed in aquariums containing 3.10 to the minus 7th power Ci/lCs107 without a stable carrier for 120 days. Cs137 accumulated mainly in the muscles and in the head (minus gills). During cooking up to 16% was removed from the fish by cleaning, including that in the scales, gills, and viscera. Of the remaining amount about 1/2 was contained in uneaten parts--bones, head, fins, but when these parts were boiled more than 70% of the isotope in these tissues entered the broth.--Copyright 1972, Biological Abstracts, Inc.
W73-07132

POWER PLANT HEAT REJECTION IN AN ARID CLIMATE,
Arizona Univ., Tucson. Engineering Experiment Station.
For primary bibliographic entry see Field 03E.
W73-07140

5C. Effects of Pollution

A STUDY OF THE RELEVANCE OF SELECTED ECOLOGICAL FACTORS RELATED TO WATER RESOURCES AND THE SOCIAL ORGANIZATION OF FISHING VILLAGES IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W73-06506

A STUDY OF PHYTOPLANKTON DYNAMICS IN LAKE FAYETTEVILLE AS A MEANS OF ASSESSING WATER QUALITY,
Arkansas Univ., Fayetteville. Water Resources Research Center.
R. L. Meyer.
Available from the National Technical Information Service as PB-217 867, $3.00 in paper copy, $0.95 in microfiche. Arkansas Water Resources Research Center, Fayetteville, Publication No. 10,

August 1971, (2nd printing). 58 p, 16 fig, 2 tab, 36 ref. OWRR A-011-ARK (3).

Descriptors: *Phytoplankton, Algae, *Diatoms, Aphonizomenon, Oscillatoria, *Cyanophyta, Chrysophyta, Oxygen, Temperature, Nitrogen, Phosphorus, Silicon, Annual cycles, Chlorophyll, Productivity, *Arkansas, Hydrogen ion concentration, Reservoirs, Water chemistry, Ecology, *Eutrophication, Limnology, *Seasonal, *Distribution patterns.
Identifiers: *Lake Fayetteville (Ark).

Phytoplankton community development was analyzed for seasonal and vertical distribution. Analysis indicates the presence of four distinct structural regimes. The winter regime is dominated by a diatom-association which includes a phytomonad component. A transition flora of green algae and chrysomonads occurs in the spring prior to stratification. This association ends abruptly with the spring regime. The spring regime is dominated by Aphanizomenon with secondary dominants of Microcystis and Coleosphaerium. This Aphanizomenon-association intergrades into the summer flora. The summer period contains three vertical components: green algae occupy the epilimnion while cryptomonads and euglenoids dominate the metalimnion and with Oscillatoria and Merismopedia in the hypolimnion. This latter flora plus the euglenoids migrate into the upper waters and dominate the fall phytoplankton. The fall-winter transition occurs during destratification with the development of a green algal flora similar to the winter-spring transition. Thermal limits, stratification and associated physico-chemical parameters are correlated to phytoplankton development and distribution. Chlorophyll-a, b, and c levels are related to community composition and concentration. Biomass corresponds to distribution and number of algae while oxygen is related to the balance between photosynthesis and respiration. Relationship between silicon, nitrogen and phosphorus base ion and phytoplankton dynamics are described. Phytoplankton quotients for describing trophic status are tested. A new geographic classification of lakes is presented.
W73-06510

WATER QUALITY OF KAPALAMA CANAL,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W73-06512

COMPARATIVE STUDY OF THE BENTHIC MICROBIAL BIOTA IN SOME COASTAL AREAS OF PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
E. Angel-Guingue.
Available from the National Technical Information Service as PB-217 874, $3.00 in paper copy, $0.95 in microfiche. Puerto Rico Water Resources Research Institute, Mayaguez, Completion Report UPRICO/WRRI/72/16/1, December 1972. 123 p, 3 fig, 63 tab, 46 ref. OWRR A-016-PR (1).

Descriptors: *Marine bacteria, *Pseudomonas, *Benthic flora, *Aquatic microbiology, Water properties, Aquatic bacteria, Aerobic bacteria, Coastal areas, Microbiology, Sea water, Sediment sampling, Water analysis, Water sampling, Dissolved Oxygen, Laboratory tests, Oxygen content, Alkalinity, Salinity, Physico-chemical properties, Water temperature, *Puerto Rico, Hydrogen ion concentration.
Identifiers: Micrococcaceae, Benthic bacteria, Bacterial morphology, *Achromobacter, Mayaguez Bay, Tallaboa Bay.

The lactic acid bacteria and the aerobic pseudomadaceae were studied. Determinations were made following the schemes devised by Simidu and Aisu and the Schemes of Bonde, Shewan et al. and the general description of groupings by Quigley and Colwell. The distinctions between pseudomnads and achromobacter were achieved using the Hugh-Leifson and motility tests, the flagellar stain or the electron microscope. If peritrichous pseudomonads were found, differentiation with achromobacter was made following the scheme of King, with enterobacteriaceae, the scheme of Ewing, and of Vibrio, either gram or flagellar stain, electron microscopy, penicillin, terramycin or 0/129 were used. The enhancement of pigment production was obtained by Paton's media and the oxidase reaction performed according to Kovacs. Aged sea water was used to best simulate the environment of these organisms. Rincon coast presents areas were pseudomonas group III predominates, while Mayaguez bay afforded no pseudomonas group I. Vibrios were absent from all these stations. Tallaboa bay shows some groups of stations to have only one species while others showed ample flora of micrococci. Several physiological characteristics of both gram positive micrococci and gram negative bacilli were found to differ from biochemical and physiological characteristics reported by others sampling from similar environments. Due to the fast development of industry in Puerto Rico with general coastal localization and increased energy demand, it is urgent to continue the study of coastal areas in relation to the benthic bacterial ecology due to the general lack of knowledge of its function and importance as the first link in the fundamental biological energy conversion chain.
W73-06517

SIMULATION OF RESPIRATION IN MICROBIAL SLIME FILMS,
Clemson Univ., S.C. Div. of Interdisciplinary Studies.
H. R. Bungay, III, and D. M. Harold, Jr.
Available from the National Technical Information Service as PB-217 879, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency, Report EPA-R3-73-005, February 1973. 39 p, 12 fig, 11 ref. Project No 16050 DXB.

Descriptors: *Dissolved oxygen, *Slime, *Computer models, *Diffusion, *Mass transfer, Model studies, *Respiration, Profiles, Computer programs, Oxygen demand, Simulation analysis.
Identifiers: *Microbial slimes, Oxygen transfer.

A matrix method has been developed for calculating dissolved oxygen profiles near and within slimes of microorganisms bathed by flowing nutrient medium. The matrix manipulations and recursions necessitated by non-linearities in the equations are carried out in FORTRAN programming on an IBM-360 computer. The computer provides numerical output and plots of dissolved oxygen concentration versus either distance from the slime surface or distance along the slime. A diffusion mechanism is assumed, and equations are derived from mass balances for oxygen and from the laws of diffusion. Although an exact mathematical model required partial differential equations, an excellent approximation is obtained by using ordinary differential equations to describe exchange between discrete sections of the nutrient medium and between discrete elements of the slime. Two situations which were studied in detail were the development of steady-state oxygen profiles as medium flowed past a microbial slime and the profile established at an infinite distance along a microbial slime. The computer models can be used to study oxygen transfer and are particularly valuable in performing sensitivity tests on various parameters. There is confirmation of the validity of the model from its ability to approximate experimentally determined oxygen profiles when using oxygen diffusivities and uptake rates derived from tests with living systems. The model is ready for further validation and subsequent use as an adjunct to experiments with real systems. (EPA)
W73-06523

THE INFLUENCE OF HERBICIDES USED ON HORTICULTURAL CROPS ON STREAM ECOLOGY,
Michigan State Univ., East Lansing. Dept. of Horticulture.
G. S. Howell, Jr., and S. K. Ries.
Available from the National Technical Information Service as PB-217 881, $3.00 in paper copy, $0.95 in microfiche. Completion Report Michigan Institute of Water Research, Lansing, January 1973. 14 p, 11 tab. OWRR A-039-MICH (1). 14-01-0001-3222.

Descriptors: *Herbicides, *Horticultural crops, Ecology, Growth, Algae, *Lake Michigan, Microorganisms.
Identifiers: *Anabena cylindrica, *Red Cedar River (Mich), *Simazine.

Very low levels of the triazine herbicide simazine appeared to elicit increases in growth of algae in culture flasks. Since the use of this chemical is both widespread and increasing in Michigan's horticultural industry and since these areas drain primarily into Lake Michigan, the ecological inferences of these preliminary findings were potentially of importance. It was determined that in spite of heavy uses of simazine on watersheds in the fruit belt of the state, and although nitrate analyses of the waters of the streams of the area indicated that a correlation of NO3 in the streams was directly related to greatest agricultural concentrations, there was no measurable simazine or other triazine herbicides in the stream. Laboratory experiments using unfiltered water from an enriched river in central Michigan indicated that simazine at the very low levels (10 to the minus 12th power M) increased the dry weight of organic material in the culture as well as chlorophyll a. These changes appear to be seasonal, as no response using the same water was elicited during the summer period and early winter. A series of experiments in pure culture with Anabena cylindrica gave an increased growth at very low levels of simazine. A procedure was developed to extract triazine herbicides from stream water. Concentrations as low as 10 to the minus 8th power could be detected using the procedure. (Ball-Michigan State)
W73-06527

FURTHER CHARACTERIZATION OF THE WATER QUALITY OF THE NEW HOPE AND LOWER HAW RIVERS INCLUDING BENTHIC MACROINVERTEBRATE DIVERSITY AND TRACE METAL ANALYSES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
C. M. Weiss, T. W. Yocum, and J. E. Minogue.
Available from the National Technical Information Service as PB-217 883, $3.00 in paper copy, $0.95 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Report No 73 (UNC-WRRI-72-73), November 1972. 178 p, 51 fig, 13 tab, 53 ref, 6 append. OWRR A-056-NC (3). 14-31-0001-3533.

Descriptors: Water pollution sources, *Eutrophication, Aquatic environment, *Organic wastes, *Heavy metals, *North Carolina, Water quality, Mercury, Cadmium, Lead, Chromium, Zinc, Benthos, Invertebrates.
Identifiers: *Haw River (NC), *New Hope River (NC).

A continuation is reported of earlier water quality studies of the Haw and New Hope Rivers of North Carolina - the principal tributaries to the Corps of Engineers New Hope Reservoir. Included are fates of conservative and non-conservative substances. Benthic macroinvertebrates showed direct relationship to water quality, though cotton characteristics were also important factors. The benthic organisms appear to provide an integrated screening for establishing gross differences in metal concentrations derived from overlying waters.
W73-06530

WASHOUT PROCESSES IN LAKE SYSTEMS,
Ohio State Univ. Research Foundation, Columbus.
For primary bibliographic entry see Field 05G.
W73-06531

THE EFFECTS OF WASTE DISPOSAL IN THE NEW YORK BIGHT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.

Summary Final Report to Army Corps of Engineers, April 1972. 70 p, 8 fig, 4 photo, 52 ref.

Descriptors: *New York, *Water pollution effects, *Waste disposal, *Solid wastes, Water quality, Water pollution, Waste treatment, Waste dumps, Waste identification, Waste water (Pollution), Water pollution sources, Marine animals, Benthic fauna, Sewage effluents, Ultimate disposal.
Identifiers: *New York Bight, Coastal waters.

A comprehensive analysis is presented of the effects of waste disposal in the New York Bight. The subjects included biological characteristics; physical and chemical properties of bottom sediments and water-borne particles; physical and chemical properties of the marine environment; and sources, disposal, and movement of waste materials. Each of these subjects was further broken down into subheadings including appropriate literature surveys, field activities, and laboratory studies. The complete final data report includes nine sections: introduction, benthic studies, zooplankton studies, finfish studies, chemical studies, surface and bottom water movement, conclusions, literature cited, and a bibliography. Present disposal practices have: (1) degraded the marine benthic communities of the New York Bight, (2) produced large amounts of flotable materials, and (3) resulted in deteriorated waters and marine sediments. (Mockler-Florida)
W73-06540

TRACE ELEMENT DISTRIBUTIONS IN WATER, SEDIMENT, PHYTOPLANKTON, ZOOPLANKTON AND BENTHOS OF LAKE MICHIGAN: A BASELINE STUDY WITH CALCULATIONS OF CONCENTRATION FACTORS AND BUILDUP OF RADIOISOTOPES IN THE FOOD WEB,
Environmental Research Group, Ann Arbor, Mich.
R. A. Copeland, and J. C. Ayers.
ERG Special Report No. 1, May 1972. 271 p, 37 fig, 29 tab, 76 ref.

Descriptors: *Lake Michigan, *Heavy metals, *Freshwater fish, *Phytoplankton, *Zooplankton, *Trace elements, *Absorption, *Sampling, Nutrients, Nuclear powerplants, Neutron activation analysis, Molybdenum, Strontium, Water pollution sources, Water pollution effects, Pollutant identification, Water analysis, Lake trout, Great Lakes, Lakes, Michigan.
Identifiers: Bioaccumulation, Biological samples, Atomic absorption spectrophotometry, Sample preservation, Selenium, Biological magnification, Ponar grab, Benthic sled, Pontoporeia, Freezing, Sample preparation, Orthophosphates, Cryptomonads, Chironomids, Sphaerids, Mysids, Mysis relicta, Macroinvertebrates, Chubs, Alewife, Lake Whitefish, Whitefish, Leeches, Goldfish, Sturegon, Vanadium, Scandium, Lanthanum, Europium, Thorium, Lutetium.

Environmental Research Group, Inc. has conducted an environmental study on samples of phytoplankton, zooplankton, benthos, water and sediment collected from Lake Michigan by the Great Lakes Research Division of the University of Michigan. These samples, collected in 1969-70 prior to the operation of all nuclear plants except Big Rock Point, were analyzed for major and trace elements. The results indicate Lake Michigan is typical of other world environments in its chemical make-up although certain elements (selenium in zooplankton and chromium and zinc in water) show significant variation in distribution within the area surveyed. Many of the biological samples were found to have become contaminated with sediment during the collecting process. ERG created a method, using scandium concentrations, by which this contamination could be corrected for after the analyses were made. Biological investigation of the data indicate that conditions in the southern basin of Lake Michigan are rapidly changing. Major changes in the species make-up of the phytoplankton are being discovered and further changes are expected in the near future. Calculations of concentration factors were made for the biota with respect to both water and sediment. It was found that concentration factors calculated with respect to water were most representative.
W73-06625

FISH SALTING WITH REFERENCE TO HETEROPHYES INFECTION,
National Research Centre, Cairo (Egypt).
A. Elias, M. G. E. Hamed, F. A. El-Wakeil, and I. O. Foda.
U A R J Vet Sci. Vol 6, No 1, p 75-87. 1969. Illus.
Identifiers: *Public health, Fish, *Heterophyes, Human diseases, Infection, Mullet, Salting, United Arab Republic, Food chains.

The majority of brackish water Mullet fish caught from Egyptian lakes served as intermediate hosts for Heterophyes parasite, while open sea Mullet was practically free from it. This parasite was able to stand relatively high salt concentrations. Therefore, lightly-salted Mullet, especially when consumed by humans after only a wk or 2 of saltcuring is quite hazardous. Heavily-salted Feseekh could be consumed rather safely, because of the higher salt concentration used, besides the long periods of salt-curing required to completely process such an end-product i.e., 'Aged Feseekh.' Salted Mullet should not leave the salting or processing plant before 6-10 days of salting, and salt concentrations below 12-16% should not be used. Copyright 1972, Biological Abstracts, Inc.
W73-06633

REMOVAL OF MINERALS FROM SOILS OF THE DRY-STEPPE SERIES DURING IRRIGATION AND RECLAMATION. (IN RUSSIAN)
Akademiya Nauk SSR, Moscow. Pochvennyi Institut.
For primary bibliographic entry see Field 03F.
W73-06635

COPPER AMMONIATE AND ITS EFFECT ON THE BODIES OF FISH, (IN RUSSIAN),
V. R. Shemchuk.
Rybn Khoz Resp Mezhved Temat Nauchn Sb. 12. p 92-98. 1971.
Identifiers: *Fish physiology, *Copper ammoniate, Fish, Protein, Serum.

The accumulation of Cu in the liver and gills of fish treated with copper ammoniate was directly proportional to the duration of treatment. Its concentration was maintained at the same level until the 10th day after the final treatment and approached the original level in 2 mo. Four-fold treatment in 48 hr with a dose of 0.3 mg/l did not cause substantial changes in the quantitative composition of protein in the blood serum and its fractions. Copyright 1972, Biological Abstracts, Inc.
W73-06636

ENVIRONMENTAL INDICATORS FOR PESTICIDES,
Stanford Research Inst., Menlo Park, Calif.
J. Strickland, and T. Blue.

Available from the National Technical Information Service as PB-210 666, $5.45 in paper copy, $0.95 in microfiche. Final Report, Prepared for Council on Environmental Quality, April 1972. 123 p, 8 fig, 15 tab. SRI Project No. ECU-1608. Contract No. EQC217.

Descriptors: *Pesticide residues, *Water pollution effects, *Monitoring, *Transportation, *Path of pollutants, *Lakes, *Rivers, *Estuaries, Fish, Public health, Wildlife, Rain, Water pollution sources, Pesticides, Insecticides, Herbicides, Fungicides, Industrial production, Storage, Air, Water pollution, Soils, Foods, Food chains, Chlorinated hydrocarbon pesticdes, Mercury, Metals, Heavy metals, Phenols, Copper, Copper sulfate, 2 4 5-T, 2 4-D, Precipitation (Atmospheric), Aldrin, DDT, Dieldrin, Endrin, Heptachlor, Carbamate pesticides, Organophosphorus pesticides, Runoff, Ponds, Swamps, Streams, Oceans, Absorption, Fishkill, Toxicity, Phosphothioate pesticides.
Identifiers: Pentachlorophenol, Parathion, Chlordane, Heptachlor epoxide, Lindane, Methoxychlor, Toxaphene.

Results are presented from a study concerned with environmental indicators of pesticides. The indicators include consideration of: (1) Production, imports, exports, and consumption of pesticides by type and over time, (2) amounts of pesticides found in food, air, water, soil, wildlife, plants, and the human body, and (3) indirect measures of pesticide utilization as they relate to public health, crop quality and yield, and recreational and aesthetic values. Steps are identified which should be taken for future collection and processing of the data necessary for caluclation of these indicators at appropriate intervals. A comprehensive framework was developed which characterizes the modes by which materials move, the mediums affected, the ecological phenomena that can be observed, and the environmental factors concerned. Recommendations are included for effectively orienting and managing pest control programs with maximum environmental enhancement. (Little-Battelle)
W73-06639

A PROXIMATE BIOLOGICAL SURVEY OF PEARL HARBOR, OAHU,
Naval Undersea Research and Development Center, San Diego, Calif.
E. C. Evans, III, T. J. Peeling, A. E. Murchison, and Q. D. Stephen-Hassard.
Available from the National Technical Information Service as AD-744 233, $3.00 in paper copy, $0.95 in microfiche. Report No. NUC TP 290, June 1972. 65 p, 23 fig, 16 tab, 29 ref, 5 append. Project Order No. PO-1-0007.

Descriptors: *Cadmium, *Copper, *Mercury, *Lead, *Zinc, *Fish, *Crabs, *Crustaceans, *Absorption, *Industrial wastes, *Biological communities, *Mollusks, *Neutron activation analysis, Periphyton, Silting, Oil spills, Domestic wastes, Sediments, Chlorinated hydrocarbon pesticides, Annelids, Isopods, Amphipoda, Metals, Heavy metals, Invertebrates, Water pollution effects, Water pollution sources, Oil pollution, Sampling, Snails, Oysters, Analytical techniques, Pesticides, Chlorinated hydrocarbon pesticides, Dieldrin, DDE, DDT, DDD, Algae, Chlorophyta, Rhodophyta, Worms, Gastropods.
Identifiers: *Voltammetry, Biological samples, Bioaccumulation, Sponges, Bryozoa, Hydroids, Pelecypods, Decapods, Chordates, Echinoderms, Macroinvertebrates, Kuhlia sandvicensis, Abudefduf abdominalis, Upeneus arge, Thalamita crenata, Podopthalmus vigil, *Pearl Harbor, Characterization, Arothron hispidus, Caranx sexfasciatus, Ctenochaetus strigosus, Acanthurus xanthopterus, Vermetus, Crepidula aculeata.

During the months of May and June, 1971, a biological survey of Pearl Harbor was conducted. The major thrust of this effort was to determine

the heavy-metal (Cd, Cu, Hg, Pb, and Zn) body burdens for marine organisms characteristic of the harbor. In addition, the general aspect of piling communities in all major lochs is described and schematically illustrated, constituting the only such description for the region in nearly three decades. It was found that the body burdens of toxic metals (Cd, Hg, and Pb) in Pearl Harbor organism (fish: Kuhlia sandvicensis, Abudefduf abdominalis, and Upeneus arge; crabs: Thalamita crenata and Podophthalmus vigil) tend to be higher near known sources of industrial effluent. Of these, two (hg and Pb) slightly exceed concentrations normally expected in marine animals; the burdens in swimming crabs tend to be highest (0.395 ppm wet weight for Hg and 1.8 ppm wet weight for Pb). For Cu and Zn, burdens tend to be greatest near Ford Island. Again, the Cu content of some swimming crabs exceeded that normally expected in marine animals (highest burden found was 241 ppm wet weight). None of these burdens, however, is considered cause for concern. The distinct differences observed in the structure of piling communities in the various lochs, and at nearby locations suggest that many complex environmental factors are at work in Pearl Harbor. While the deterimental effects of oil exposure are evident in the intertidal communities in all lochs, the major degrading factor to the marine environment as a whole appears to be silt. Curiously, water clarity and relative marine community health are greatest in those parts of the harbor receiving more intensive utilization by the Navy. Thus, on the basis of this proximate survey, it is by no means obvious that the Navy is the principal polluter of Pearl Harbor. (Little-Battelle)
W73-06640

THE VERTICAL DISTRIBUTIONS AND DIURNAL MIGRATIONS OF CALANOID COPEPODS COLLECTED ON THE SOND CRUISE, 1965. I. THE TOTAL POPULATION AND GENERAL DISCUSSION,
National Inst. of Oceanography, Wormley (England).
For primary bibliographic entry see Field 05B.
W73-06651

THE VERTICAL DISTRIBUTIONS AND DIURNAL MIGRATIONS OF CALANOID COPEPODS COLLECTED ON THE SOND CRUISE, 1965. II. SYSTEMATIC ACCOUNT: FAMILIES CALANIDAE UP TO AND INCLUDING THE AETIDEIDAE,
National Inst. of Oceanography, Wormley (England).
For primary bibliographic entry see Field 05B.
W73-06652

THE PRESERVATION OF SOME OCEANIC ANIMALS FOR LIPID ANALYSIS,
National Inst. of Oceanography, Wormley (England).
For primary bibliographic entry see Field 05A.
W73-06663

THE EFFECTS OF WASTE DISPOSAL IN THE NEW YORK BIGHT. SUMMARY FINAL REPORT.
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Sprot Fisheries Marine Lab.

Available from the National Technical Information Service as AD743936, $3.00 in paper copy, $0.95 in microfiche. Informal Report No 2, April 1972. 73 p, 10 fig, 52 ref.

Descriptors: *Sewage disposal, *Sludge disposal, *Water pollution effects, *Ecological distribution, *Animal populations, Marine animals, Water analysis, Benthic fauna, Water quality, Zooplankton, Coliforms, Crustaceans, Heavy metals, Chemical analysis, Nutrients, Water circulation, Molluscs, Soil analysis, Water sampling, Sewage sludge, Standing crops, Biomass, Protozoa, Sediments, Fish diseases, Water pollution sources, Systematics.
Identifiers: *Marine environment, *New York Bight, Macroinvertebrates, Chaetognaths, Phoronids, Species diversity, Polychaetes, Echinoderms, Foraminifera, Cynoscion regalis, Evadne, Bivalves, Cladocera, Nauplii, Siphonophores, Penilia, Podon, Limnacia, Mackerels, Porgies, Flounders, Pelagic animals, Merluccius bilinearis, Urophycis chuss, Pseudopleuronectes americanus, Limanda ferruginea, Scophthalmus aquosus, Myoxocephalus octodecemspinosus, Scomber scombrus, Stenotomus chrysops.

Results are summarized of studies conducted to obtain data to assess the effects of waste disposal on the marine environment of the New York Bight. (See also W73-06669) (Holoman-Battelle)
W73-06668

THE EFFECTS OF WASTE DISPOSAL IN THE NEW YORK BIGHT. SECTION 4. FINFISH STUDIES.
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Sport Fisheries Marine Lab.

Available from the National Technical Information Service as AD739 534, $3.00 in paper copy, $0.95 in microfiche. Final Report, February 1972. 24 p, 4 fig, 9 tab, 500 ref.

Descriptors: *Waste disposal, *Water pollution effects, *Heavy metals, *Sewage sludge, Benthic fauna, Zooplankton, Sampling, Distribution patterns, Animal parasites, Suspended solids, Marine fish, Fish diets, Animal pathology, Crustaceans, Fish eggs, New York, Shrimp, Crabs, Amphipoda, Isopods, Clams, Nematodes, Mollusks, Sediments, Sea water, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Zinc, Sculpins, Herrings, Marine algae, Sands, Gravels.
Identifiers: *Finfish, *New York Bight, Whiting, Ling, Flounder, Mackerel, Porgy, Crangon, Cumaceans, Bivalves, Polychaetes, Sea Anenomes, Hydra, Arsenic, Tapeworms, Flatworms, Squid, Hair, Mustelus canis, Squalus acanthias, Raja eglanteria, Alosa aestivalis, Alosa mediocris, Alosa pseudoharengus, Alosa sapidissima, Clupea harengus harengus, Lophius americanus, Gadus morhua, Merluccius bilinearis, Urophycis chuss, Urophycis regius, Urophycis tenuis.

A study of the New York Bight was undertaken to determine the effects of sewage sludge on benthic fishes. Several sampling stations were selected for comparability of depth to Station 70, the designated sewage sludge disposal site. Groundfish were collected at frequent intervals in and beyond the area immediately affected by the sludge usirg two otter trawls which were towed for 15 minutes at 3 knots. Captured fish were sorted to species, counted and a subsample measured for total length. A sample of 10 to 20 yellowtail flounder (Limanda ferruginea), winter flounder (Pseudopleuronectes americanus), ling (Urophycis chuss), and whiting (Merluccius bilinearis), each was preserved for analysis of stomach contents. Identifiable contents were enumerated by species whenever possible. Whole fish were frozen and sent to several laboratories for analysis of heavy metals and pesticides. Fish actively feed throughout the year in and around the area of sewage sludge disposal as evidenced by the ingested carbon-rich aggregate particles, 'band-aids', hair, and cigarette filters. Heavy metal analysis of fish collected in this area showed elevated levels of Ni, Cr, and Pb; in several fish the levels exceeded the standards of the Federal Water Pollution Control Administration (1968) designated as normals for marine animals. (See also W73-06668) (Long-Battelle)
W73-06669

BIOLOGICAL EFFECTS OF ATMOSPHERIC POLLUTANTS. FLUORIDES.

National Academy of Sciences, Washington, D.C. 1971. 295 p, 38 fig, 45 tab, 751 ref.

Descriptors: *Fluorides, *Path of pollutants, *Pollutant identification, *Water analysis, *Animal physiology, *Plant physiology, Absorption, Soil analysis, Public health, Vegetation, Agronomic crops, Cereal crops, Grasses, Water pollution sources, Soil contamination, Shrimp, Industrial wastes, Animal pathology, Plant pathology, Spatial distribution, Temporal distribution, Chemical analysis, Fluorine, Essential nutrients.
Identifiers: *Fate of pollutants, Biotransformation, Sample preparation, Biological magnification, Enzymatic techniques, Tissue.

This document was prepared at the request of the Air Pollution Control Office (APCO) of the Environmental Protection Agency to provide a scientific basis for APCO to issue an air quality criteria document on airborne fluoride. There is a brief introduction, to give the reader familiarity with fluoride and the history of man's understanding of its biologic effects. Following this is an environmental appraisal that treats the sources, both natural and man-made, and then a discussion of the transfer of fluoride in the environment, its physical and chemical changes, its regional and local variations, and its biologic transformations. A chapter is included on the accurate sampling and analysis of fluorides. The effects of fluoride on enzymes, cells, and isolated organ and tissue systems and its metabolic effects on intact plants, animals, and humans are examined. Like other pollutants, airborne fluoride can be additive to fluoride accumulated by other routes; therefore, it was considered essential to evaluated the total burden of fluorides in these living systems. Recommendations are given for future research. (Holoman-Battelle)
W73-06670

DEGRADATION OF NAPHTHALENE TO SALICYLIC ACID BY CULTURES OF PSEUDOMONAS DENITRIFICANS AND ACHROMOBACTER SP. FROM THE EFFLUENTS OF PETROLEUM REFINERY,
Slovak Technical Univ., Bratislava (Czechoslovakia). Dept. of Microbiology and Biochemistry.
For primary bibliographic entry see Field 05B.
W73-06672

THE EFFECTS OF DDT, TOXAPHENE, AND DIELDRIN ON SUCCINIC DEHYDROGENASE ACTIVITY IN INSECTICIDE-RESISTANT AND SUSCEPTIBLE GAMBUSIA AFFINIS,
Mississippi State Univ., State College. Dept. of Zoology.
G. B. Moffett, and J. D. Yarbrough.
Journal of Agricultural and Food Chemistry, Vol 20, No 3, p 558-560, May-June 1972. 1 tab, 18 ref.

Descriptors: *DDT, *Dieldrin, Resistance, Water pollution effects, *Pesticide toxicity, Enzymes, Membranes, Freshwater fish, Chlorinated hydrocarbon pesticides, Temperature, Nutrients, Assay.
Identifiers: *Toxaphene, *Succinic dehydrogenase, Susceptibility, *Mosquitofish, *Gambusia affinis, Mitochondria, Liver, Brain, Enzymatic inhibitors, Sample preparation.

Succinic dehydrogenase activity in mitochondria of insecticide-resistant and susceptible mosquitofish (Gambusia affinis) was assayed manometrically by the phenaznine methosulfate method to determine the effects of DDT, toxaphene, and dieldrin. Intact and disrupted mitochondria from livers and brains were used. The enzymatic activity in intact mitochondria from resistant fish was either stimulated or not affected by dieldrin or DDT. Toxaphene inhibited intact mitochondrial

preparations from resistant brain tissue. Succinic dehydrogenase activity in intact susceptible mitochondria was inhibited by all three insecticides. In mitochondria with disrupted membranes, enzymatic activity was inhibited by the insecticides in both resistant and susceptible fish. Inhibition of succinic dehydrogenase activity by the insecticides only after disruption of the resistant mitochondrial membrane indicates that a membrane barrier exists in insecticide-resistant mosquitofish. (Byrd-Battelle)
W73-06674

ESTIMATING THE RATE OF DEGRADATION OF CELLULOSE FIBERS IN WATER,
Uppsala Univ., (Sweden). Inst. of Limnology.
B. V. Hofsten, and N. Edberg.
Oikos, Vol 23, No 1, p 29-34, 1972. 4 fig, 1 tab, 15 ref.

Descriptors: *Degradation (Decomposition), *Cellulose, *Aquatic environment, Rates, *Aerobic conditions, *Anaerobic conditions, Water quality, Fibers (Plant), Carbohydrates, Organic compounds, Methodology, Lignins, Cotton, Water temperature, Hydrogen ion concentration, Dissolved oxygen, Sulfite liquors, Pulp wastes, Lake sediments, Eutrophication.
Identifiers: *Lake Malaren, Fyris River.

A method is described by which the rate of degradation of different kinds of cellulose fibers was determined in aquatic environments. The fiber samples were enclosed in small bags of nylon fabric with a fine mesh and weight losses of bags placed in water or sediments were measured over periods of several months. Newly processed pulp fibers were rapidly degraded in aerobic, nutrient-rich water whereas previously dried pulp and fibers derived from cotton were degraded more slowly. Lignin-containing mechanical pulp was hardly degraded at all. Cellulose decomposition was slow in unpolluted seawater and in the heavily polluted, anaerobic water outside a paper mill but relatively rapid both in the anaerobic water and the sediment of a nutrient-rich lake. The applications and limitations of the bag method in studies of decomposition processes in aquatic ecosystems are discussed. (Holoman-Battelle)
W73-06678

BEHAVIORAL THERMOREGULATION BY FISHES: A NEW EXPERIMENTAL APPROACH,
National Marine Fisheries Service, Honolulu, Hawaii. Southwest Fisheries Center.
For primary bibliographic entry see Field 07B.
W73-06687

THE EFFECT OF TEMPERATURE AND WATER CHEMISTRY ON THE LIFE-CYCLE OF PLANARIS TORVA (MULLER) (TURBELLARIS:TRICLADIDA),
University Coll. of North Wales, Bangor. Dept. of Zoology.
A. D. Sefton, and T. B. Reynoldson.
Journal of Animal Ecology, Vol 41, No 2, p 487-494, June 1972. 1 fig, 3 tab, 9 ref.

Descriptors: Biology, Systematics, Chemistry, Ecology, *Aquatic animals, Aquatic environment, *Environmental effects, Heated water, *Water temperature, Lakes, Temperature, *Water chemistry, Water pollution effects.
Identifiers: *Planaria torva.

The physico-chemical factors in the ecology of Planaria torva, in the lakes of Great Britain are discussed, with emphasis on the effects of temperature. Planaria torva produces viable cocoons at temperatures ranging from 1.5C to 20C and young mature effectively over a range of 3.5C to 20C. The developmental rate for one generation was most rapid at 10C. Water chemistry was not shown to have a great effect on the Planaria torva as they reproduce well in minerally deficient waters. In comparison with four other species of triclad common in British lakes, the Planaria torva appears a hardy competitor. It does not seem that temperature plays a major role in determining the distribution and abundance of triclads. (Jerome-Vanderbilt)
W73-06691

DESIGN VERSUS ECOLOGY IN ST. JOHNS AND INDIAN RIVERS,
Reynolds, Smith and Hills, Jacksonville, Fla.
H. A. Scott.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 98, No WW4, p 425-432, November 1972. 2 fig, 8 ref.

Descriptors: *Environmental effects, *Dredging, *Channel flow, Canal design, Inland waterways, Surface drainage, Ecology, Fish, Waterfowl, Spawning, Marsh management, *Florida, Dams, Rivers, Water pollution effects.
Identifiers: *St. Johns River (Fla), *Indian River (Fla).

In a discussion of proposals for alterations to the upper St. Johns and Indian Rivers in Florida, environmental considerations were brought to light in order to show how ecological disruption could be minimized through proper planning. The major dangers are destruction of spawning areas for several important species of fish and drainage of the large flood plain marsh where many varieties of water fowl breed, through dredgings and straightening of several stretches of river. These could be partially avoided through coordination of design with professional environmental planners' goals. Although some ecological disruption is unavoidable in such a project, spoil could be placed on river banks, or lands and structures could be used to maintain flows in the existing river channel to protect fish spawning areas. (Jerome-Vanderbilt)
W73-06692

EFFECTS OF TEMPERATURE ON THE INTEGRITY OF BACILLUS PSYCHROPHILUS CELL WALLS,
Medical Coll. of Georgia, Augusta. Dept. of Cell and Molecular Biology.
S. J. Mattingly, and G. K. Best.
Journal of Bacteriology, Vol 109, No 2, p 645-651, February 1972. 5 fig, 4 tab, 13 ref. PHS Grant AI 09699.

Descriptors: *Biological membranes, *Bacteria, *Temperature, Microbiology, Metabolism, Absorption, Heating, Heat resistance, Thermal pollution, Microenvironment, Enzymes, Proteins, Water pollution effects.
Identifiers: Lysis.

Cell walls isolated from Bacillus psychrophilus autolyse at temperatures which support growth. At temperatures above the maximum growth temperature (28 C), a nonenzymatic lysis occurs. Removal of autolytic enzyme activity with 10 M LiCl had little effect on the rate or extent of lysis at elevated temperatures (37 and 45 C). Nonenzymatic lysis was characterized chemically by a decrease in the liberation of N-terminal groups, and the effects of pH, Ca (++), and ethylenediaminetetraacetic acid suggest that ionic linkages are involved in much of the integrity of the cell wall of this psychrophile. The nonenzymatic absorbance decrease at 45 C can be reversed to the extent of 70 to 100% at 0 C. Centrifugation of a heat-lysed wall suspension separated a soluble protein component which is required for low temperature reaggregation. Preliminary evidence indicates the insoluble residue which remains after temperature mediated lysis is primarily peptidoglycan. (Jerome-Vanderbilt)
W73-06694

BIOCHEMICAL STUDIES ON THE THERMAL DIMORPHISM OF PARACOCCIDIOIDES BRASILIENSIS,
Instituto Venezolano de Investigaciones Cientificas, Caracas. Center of Microbiology and Cell Biology.
F. Kanetsuna, L. M. Carbonell, I. Azuma, and Y. Yamamura.
Journal of Bacteriology, Vol 110, No 1, p 208-218, April 1972. 4 fig, 2 tab, 37 ref.

Descriptors: *Bacteria, Biochemistry, *Biological membranes, Microbiology, Cytological studies, Fungi, Enzymes, Proteins, Yeasts, Metabolism, Growth rates, Temperature.
Identifiers: *Polysaccharides, *Thermal dimorphism, Glucans, Cell wall fractionation, *Paracoccidioides brasiliensis.

The biochemical and morphological changes of the yeastlike (Y) form to the mycelial (M) form of Paracoccidioides brasiliensis were examined. The main polysaccharide of hexoses of the Y-form cell wall was alpha-glucan, whereas the polysaccharides of the M-form cell wall were beta-glucan and galactomannan. The alpha-glucan of the Y form contained mainly alpha (1-3)-glycosidic linkage with a few branches at C-6 position. The incorporation of (14)C-glucose into the cell wall glucans showed that synthesis of alpha-glucan decreased rapidly after the temperature of the culture was changed from 37 to 20 C. The synthesis of beta-glucan was augmented at an early stage of the morphological change. The M-form cell wall contained 12 times more disulfide linkage than the Y form. The cell-free extracts of the whole cell of the Y form had five times more protein disulfide reductase activity than the M form, whereas extracts of the M form contained five to eight times more beta-glucanase activity than the Y form. From these results, a hypothesis for the production of the M form from the Y form is proposed. (Jerome-Vanderbilt)
W73-06696

UPPER LETHAL TEMPERATURES OF THE PELECYPOD MODIOLUS DEMISSUS IN RELATION TO DECLINING ENVIRONMENTAL TEMPERATURES,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
D. L. Waugh.
Canadian Journal of Zoology, Vol 50, No 7, p 523-527, 1972. 2 fig, 2 tab, 6 ref.

Descriptors: Estuaries, *Mussels, *Temperature, *Lethal limit, *Thermal pollution, Environment, Intertidal areas, Heat resistance, Biorhythms, Biology, Seasonal, Water pollution effects, *Mollusks.
Identifiers: *Modiolus demissus.

The influence of acclimatization on the estuarine intertidal pelecypod ribbed mussel during the cooling period from July 1967 to March 1968 was studied. The estuary temperatures ranged from 40 C in mid summer to -10 C in autumn. Specimens were taken from the estuary at various times throughout this period and lethal temperatures were determined. The spread of upper lethal temperatures varied only 2 C, while the spread of the acclimatization temperature was 24 C. It was found that the rate of loss of higher thermal acclimatization is slower in intact animals than is the rate of gain of heat tolerance in gill cilia of ribbed mussel. (Jerome-Vanderbilt)
W73-06697

EFFECTS OF TEMPERATURE VARIATION ON THE FATTY ACID COMPOSITION OF CANDIDA UTILIS,
Newcastle-upon-Tyne Univ. (England). Dept. of Microbiology.
I. McMurrough, and A. H. Rose.
Journal of Bacteriology, Vol 107, No 3, p 753-758, September 1971. 3 fig, 4 tab, 13 ref.

Descriptors: *Lipids, *Temperature, *Yeasts, Microbiology, Growth rates, Environmental effects, Chemical analysis, Research, Thermal properties, Metabolism, Stability, Cultures, Gas chromatography.
Identifiers: *Fatty acids, *Candida utilis.

The fatty acid compositions of various cultures of the yeast Candida utilis NCYC 321 were analyzed by gas-liquid chromatography of the methyl esters obtained from the lipids in chloroform-methanol extracts of the cells. Over a wide range of growth conditions C. utilis contained mainly 16:0, 16:1, 18:1, 18:2, and 18:3 fatty acids in variable proportions. The most variable aspect of the fatty-acid composition of C. utilis was in the relative proportions of 18:1, 18:2, and 18:3 acids. During batch growth at 30 C, the relative proportions of 18:3 decreased, whereas 18:1 increased as the cultures aged. Batch cultures grown at low temperatures maintained higher proportions of 18:3 acids than cultures grown at 30 C. When stationary cultures were replenished with fresh medium under aerobic conditions, there was an abrupt increase in the proportion of 18:3 with a concomitant decrease in 18:1 acids in the cells. The fatty acid composition of cells grown at 30 C did not vary much in response to changes in either the growth rate or the growth-limiting substrate. Cells contained highest proportions of 18:3 acid when grown under conditions of glucose-limitation at low temperatures. (Jerome-Vanderbilt)
W73-06704

WATER-BORNE TYPHOID FEVER CAUSED BY AN UNUSUAL VI-PHAGE TYPE IN EDINBURGH,
Western General Hospital, Edinburgh (Scotland). Central Microbiological Lab.
For primary bibliographic entry see Field 05B.
W73-06744

THE PHOSPHATE STORY,
Westchester County Dept. of Health, White Plains, N.Y. Div. of Environmental Health Services.
C. E. Weber.
Journal of Milk Food Technology, Vol 35, No 10, p 597-603, 1972. 35 ref.

Descriptors: *Phosphorus, *Eutrophication, *Detergents, *Phosphates, Water pollution, Water pollution sources, Algae, Effluents, Pollution abatement, Pollutant identification, Carbon, Nitrogen, Nutrient removal, Legislation.
Identifiers: Governmental bans.

Although there is evidence that phosphates contribute to eutrophication, there is other evidence that indicates that carbon, nitrogen or other nutrients are the critical factors. There are alternatives to phosphates in detergents and alternatives to removal of phosphates from detergents. Although legislation has passed in various governmental jurisdictions to control the use of phosphates and detergents or to ban their use entirely, some individuals are concerned that the replacement of phosphates in detergents with other material will create even more serious pollution hazards. Even if technology can reduce the phosphorous level below the minimum for massive algal growth from all effluents, the eutrophication process will continue because of the presence of natural phosphorus or otherwise existing phosphorus in the water. (Smith-Texas)
W73-06749

DENITRIFICATION AND NITRATE REDUCTION IN WISCONSIN LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W73-06751

STUDIES OF THE EFFECT OF DESALINATED DRINKING WATER ON THE FUNCTIONAL STATE OF THE ORGANISM,
Institute of General and Municipal Hygiene, Moscow (USSR).
G. I. Sidorenko, A. I. Bokina, V. K. Fadeeva, D. A. Selidovkin, and K. S. Rozval.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 1-3, p 180-185, January-March, 1971. 2 fig, 2 tab, 2 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Desalination, *Desalination plants, *Potable water, *Water supply, *Organoleptic properties, Water quality, Water quality control, Water treatment, Water pollution effects.
Identifiers: *Water-salt metabolism, USSR, *Shevchenko.

The effect of deslinated drinking water on the functional state of the body and the health of the population in Shevchenko was investigated. In persons that use desalinated water for various periods of time, the state of water-salt metabolism, the cartiovascular system, certain indices of the renal activity, the functioning of the gastrointestinal tract and complicated reflex drinking reactions were determined. Among inhabitants who had drunk the desalinated seawater for a prolonged period, there was a trend toward gastric hypoacidity. (Smith-Texas)
W73-06769

EXPERIMENTAL DATA FOR THE VALIDATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF COBALT IN WATER BODIES,
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Environmental Hygiene.
G. N. Krasovskii, and S. A. Fridlyand.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 277-279, January-March, 1971. 1 tab. Trans from Gigiena i Sanitariya.

Descriptors: *Cobalt, *Toxicity, *Organoleptic properties, *Water quality, Water quality standards, Heavy metals, Water treatment, Potable water, Water supply, Biochemical oxygen demand.
Identifiers: *Cobalt salts, Maximum permissible concentration, Cobalt stability, USSR.

An investigation was conducted to determine the toxicity parameters of various cobalt salts and pure cobalt in water. The results established that cobalt salts were similar in toxicity, with the chloride being slightly more toxic than the others. It is recommended that standards for all inorganic cobalt compounds be based on the toxicity criteria and the maximum permissible concentration of cobalt in water bodies shoud be set at 1 mg/l cobalt ion. This concentration may be recommended as the hygienic standard for drinking water supplied by centralized water supply systems. (Smith-Texas)
W73-06773

NATURAL CONCENTRATION OF TUNGSTEN IN WATER SOURCES OF CERTAIN POPULATED AREAS IN THE MIDDLE AND SOUTHERN URALS,
Institut Gigieny Truda i Profzabolevanii, Sverdlovsk (USSR).
For primary bibliographic entry see Field 05B.
W73-06774

HYGIENIC CHARACTERISTICS OF THE NEMATOCIDE NEMAGON IN RELATION TO WATER POLLUTION CONTROL,
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 05B.
W73-06779

ON THE CONTENT OF CARCINOGENIC HYDROCARBONS IN SURFACE WATERS,
Institut Eksperimentalnoi i Klinicheskoi Onkologii, Moscow (USSR).
For primary bibliographic entry see Field 05B.
W73-06788

HYGIENIC STANDARDS FOR BENZENESULFONAMIDE AND BENZENESULFONYL CHLORIDE AS INDUSTRIAL POLLUTANTS IN SURFACE WATERS,
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 05B.
W73-06790

TEMPERATURE, TRANSPARENCY, AND PHYTOPLANKTON PRODUCTIVITY IN CRATER LAKE, OREGON,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
D. W. Larson.
Limnology and Oceanography, Vol 17, No 3, p 410-417, 1972. 3 fig, 8 tab, 23 ref. OWRR A-001-ORE (17).

Descriptors: *Lakes, *Temperature, *Turbidity, *Phytoplankton, Productivity, *Oregon, Chlorophyll, Depth, Light penetration, Oligotrophy, Dissolved oxygen, Hydrogen ion concentration, Alkalinity, Diatoms, Secchi disks.
Identifiers: *Crater Lake (Ore.), *Transparency.

Crater Lake, Oregon, deepest United States lake, featuring unusual transparency and thermal gradients, was sampled for temperature, transparency and primary productivity. It is located about 105 km north of the Oregon-California border and is 195 km inland from the Pacific Ocean, occupying the collapse caldera of volcanic Mt. Mazama and is approximately 6600 years old. It seldom freezes over. Phytoplankton primary productivity was measured in situ with C-14. Maximum productivity and the largest concentration of chlorophyll a in Crater Lake during the summers of 1968 and 1969 occurred at depths where temperatures were near 4C and measurable light less than 4% of surface illumination. It is suggested that the phytoplankton in the lake consists mostly of oligothermal-oligophotic populations that are limited to depths greater than 70 meters in summer, but occupy the 0-70 meter stratum in winter, so that a rather constant production rate per unit area is maintained throughout the year. Certain diatoms, for example, Asterionella, are distributed between even greater depths--100-200 meters. Sampling Crater Lake during winter would prove a difficult task; snowfall (September-June) averages about 14 meters annually and avalanches are common. (See also W71-03042) (Jones-Wisconsin)
W73-06863

TRANSFER OF INORGANIC MERCURY TO MILK OF GOATS,
South Dakota School of Mines and Technology, Rapid City.
For primary bibliographic entry see Field 05B.
W73-06867

CONTAMINATION OF SOIL AND VEGETATION NEAR A ZINC SMELTER BY ZINC, CADMIUM, COPPER, AND LEAD,
Rutgers - The State Univ., New Brunswick, N. J. Inst. of Microbiology.

For primary bibliographic entry see Field 05B.
W73-06870

INFLUENCE OF MAGNESIUM AND MANGANESE ON SOME BIOLOGICAL AND PHYSICAL PROPERTIES OF TETRACYCLINE,
Bar-Ilan Univ., Ramat-Gan (Israel).
D. Sompolinsky, and Z. Samra.
Journal of Bacteriology, Vol 110, No 2, p 468-476, May 1972. 8 fig, 1 tab, 31 ref.

Descriptors: *Bacteria, *Magnesium, *Manganese, *Metabolism, Biology, Cytological studies, *E. coli, Enzymes, Growth rates, Metals, Inhibitors, Resistance, Radioisotopes, Tritium.
Identifiers: *Staphylococcus aureus, *Tetracycline.

Accumulation of (3)H tetracycline in non-proliferating cells of susceptible and resistant strains of Escherichia coli and Staphylococcus aureus in tris (hydroxymethyl)aminomethane (Tris) buffer (10 mM, pH 7.5) was significantly decreased in the presence of 5 to 40 mM MgC12 and increased in the presence of 5 to 10 mM MnC12. When the bacteria first accumulated (3)H-tetracycline in plain Tris HC1, and the metal slats were thereafter added, a prompt decrease or increase in radioactivity of the cells was observed after the addition of Mg (++) or Mn (++), respectively. In phosphate buffer (10mM, pH 7.5), the effect of Mg (++) was delayed. Three minutes after addition of (3)H-tetracycline, uptake was as in the control cell suspension, but thereafter it dropped rapidly. When (3)H-tetracycline was incubated with Mg (++) before addition to the bacterial suspension, uptake was scarcely measurable. The addition of Mg (++) to growing cultures of S. aureus and E. coli caused a marked decrease in susceptibility; in contrast, no increase in susceptibility could be demonstrated when Mn (++) was added. It was also demonstrated that Mg (++) and Mn (++) had distinct influences on the absorption spectrum, the optical rotatory dispersion, the circular dichroism, and the lipid solubility of tetracycline. (Jerome-Vanderbilt)
W73-06871

MANGANESE-RESISTANT MUTANTS OF ESCHERICHIA COLI: PHYSIOLOGICAL AND GENETIC STUDIES,
Washington Univ., St. Louis, Mo. Dept. of Biology.
S. Silver, P. Johnseine, E. Whitney, and D. Clark.
Journal of Bacteriology, Vol 110, No 1, p 186-195, April 1972. 9 fig, 3 tab, 29 ref.

Descriptors: *E. coli, *Metals, *Manganese, *Resistance, Biochemistry, Absorption, Bacteria, Cytological studies, Metabolism, Inhibitors, Magnesium, Calcium, Growth rates, Genetics.
Identifiers: *Mutants.

Manganese is growth inhibitory for Escherichia coli. The manganese concentration required for inhibition is dependent upon the magnesium concentration of the medium. Mutants have been isolated which are partially resistant to manganese inhibition in both liquid and solid media. From conjugation experiments, the genetic locus for manganese-resistance, mng, appears to be between 34 and 37 min on the E. coli genetic map. Experiments with radioactive (28)Mg lead to the tentative conclusion that the mng mutants are altered in the inhibition constant for manganese as a competitive inhibitor for the magnesium accumulation-system. Once high manganese enters the cells, it displaces internal magnesium and leads to a net cellular loss and hence growth inhibition. The mng mutants are somewhat less subject to manganese-induced magnesium loss under comparable conditions than are manganese-sensitive wild-type cells. (Jerome-Vanderbilt)
W73-06872

SUBTLE CONSEQUENCES OF METHYLMERCURY EXPOSURE: BEHAVIORAL DEVIATIONS IN OFFSPRING OF TREATED MOTHERS,
Minnesota Univ., Minneapolis. Coll. of Medical Science.
J. M. Spyker, S. B. Sparber, and A. M. Goldberg.
Science, Vol 177, No 4049, p 621-623, August 18, 1972. 1 fig, 12 ref.

Descriptors: *Mercury, *Pathology, *Laboratory animals, Toxicity, Path of pollutants, Animal metabolism, Reproduction, Pollutant identification, Laboratory tests, Environmental effects, Heavy metals, Methylmercury, Organomercurials, Neurological impairment, Mice.
Identifiers: *Methylmercury.

Overt neurological impairment is the endpoint currently used to document a case of methylmercury poisoning. No consideration is given to possibly subtle consequences. Offspring from mice exposed to methylmercury on day 7 or 9 of pregnancy were apparently unaffected during postnatal development. However, subtle behavioral differences between treated and control offspring were found when the overtly normal animals were tested in an open field and evaluated in a swimming apparatus at 1 month of age. Brain weight, protein, choline acetyltransferase, and cholinesterase were not significantly altered. (Oleszkiewicz-Vanderbilt)
W73-06878

LEAD POISONING: ZOO ANIMALS MAY BE THE FIRST VICTIMS,
R. J. Bazell.
Science, Vol 173, No 3992, p 130-131, July 9, 1971.

Descriptors: *Lead, *Heavy metals, *Animal pathology, Zinc, Animal diseases, Toxicity, New York, *Air pollution, Path of pollutants, Environmental effects, Grasses, Paints, Soils.
Identifiers: *Poisoning, *Lead poisoning, Automobile exhausts, *New York City zoos.

A mysterious disease killing inhabitants of two New York City zoos has been definitely identified as heavy metal poisoning. Lead and zinc were primarily responsible for the poisoning of victims which ranged from reptiles to primates. It was found that supposedly lead-free paint contained from 0.01 - 3% lead, and that the grass and soil outside the cages contained lead in quantities as high as 3900 micrograms per milligram dry weight - an amount equal to or exceeding that found along the sides of major highways. It is thought that this severe lead pollution is a result of atmospheric fallout. (Oleszkiewicz-Vanderbilt)
W73-06882

LEAD SUPPRESSION OF MOUSE RESISTANCE TO SALMONELLA TYPHIMURIUM,
Iowa State Univ., Ames.
F. E. Hemphill, M. L. Kaeberte, and W. B. Buck.
Science, Vol 172, No 3987, p 1031-1032, June 4, 1971. 1 fig, 7 ref.

Descriptors: *Lead, *Heavy metals, *Animal pathology, Pathology, Animal diseases, Animal physiology, Toxicity, *Salmonella, *Disease resistance.
Identifiers: Poisoning, Lead poisoning, Clinical studies.

Mice were treated with subclinical doses of lead nitrate for 30 days. Lead-treated mice showed greater susceptibility to challenge with Salmonella typhimurium than controls which received no lead. This result confirms the hypothesis that treatment with lead reduces the resistance of mice to bacterial infection. (Oleszkiewicz-Vanderbilt)
W73-06884

THE POSSIBLE IMPORTANCE OF FECAL MATERIAL IN THE BIOLOGICAL AMPLIFICATION OF TRACE AND HEAVY METALS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 05B.
W73-06887

OVERFED,
J. Crossland, and J. McCaull.
Environment, Vol 14, No 9, p 30-37, November 1972, 1 tab, 3 photo, 30 ref.

Descriptors: *Eutrophication, *Water pollution sources, *Waste water disposal, *Nutrients, *Lakes, Water pollution effects, Nitrogen, Phosphorus, Sewage treatment, Waste water treatment, Social aspects, Political aspects, Aquatic plants, Detergents.
Identifiers: *Eutrophication reversal.

The nature of eutrophication and its implications for man's activities are discussed. Eutrophication is the progressive deterioration of a water body, generally lakes or ponds, due to overenrichment with nutrients primarily nitrogen and phosphorous. Natural eutrophication is intensified by the various wastes generated by man and disposed of in water bodies. A particularly insidious form of pollution by eutrophication results when treated sewage effluent is released to water bodies, especially lakes. The remaining nutrients left in the treated waste water still are sufficient to hasten eutrophication. The nature of sewage treatment; the role of nutrients in the growth of aquatic plants, especially nitrogen and phosphorous; the sources of nutrients; the possibilities for limiting the use of unnecessary nutrients and the social and political ramifications of such limitations, especially the use of phosphates in detergents; and possibilities of reversing the eutrophication process are discussed. (Davis-Chicago)
W73-06923

BEHAVIOR OF ATLANTIC SALMON (SALMO SALAR L.) UNDER CONDITIONS OF ARTIFICIAL INTERFERENCE FROM THE NIZHNE TULOMA HYDROELECTIC POWER PLANT, (IN RUSSIAN),
A. G. Poddubnyi, L. K. Malinin, and V. V. Gaiduk.
Biol Vnutr Vod Inf Byull. 10. p 57-61. 1971.
Identifiers: *Atlantic salmon, Behavior, *Hydroelectric power plants, Interference, Nizhne, Tuloma, Salmo-Salar, Salmon, USSR.

Behavior of Atlantic salmon in the dam area was substantially affected by the work regime of the hydroelectric power station. The greatest entry of fish into the fish station was observed during the morning and evening at the beginning of ebb and flood tides, when the water level was 1-2 m below maximum.--Copyright 1972, Biological Abstracts, Inc.
W73-06930

OXYGEN CONSUMPTION BY THE SEABED. VI. SEASONAL CYCLE OF CHEMICAL OXIDATION AND RESPIRATION IN PUGET SOUND,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-06933

THE MUTAGENIC ACTIVITY OF CERTAIN POLYMERS USED FOR WATER DESALINATION, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Selskoi Gigieny, Saratov (USSR).
E. V. Shtannikov, G. I. Rozhnov, L. A. Sokolova, and B. M. Khonin.
Gigiena i Sanitarya, No 2, p 17-22, February 1972. 3 fig, 4 tab.

Descriptors: *Toxicity, *Polymers, Organic compounds, Filters, Desalination apparatus, Resins, Membranes, Diptera, Animal physiology, Invertebrates, Insects, Plants, Plant physiology.
Identifiers: Acetylcellulose, Formamide, AB-21 resin, Crepis capillaris, Drosophila melanogaster, Mutagens, Mutagenicity, Macroinvertebrates.

Certain polymers (technical AB-21 resin, technical MA-41 membrane) have a definite mutagenic activity and others (acetylcellulose film treated with formamide) are embryotoxic. The latter caused a fall of the mitotic index of Crepis capillaris, inhibited the cellular multiplication of bone marrow in rats, decreased the viability of Drosophila melanogaster and augmented the mortality of embryos and the incidence of embryonic anomalies in albino rats. (Little-Battelle)
W73-06935

EFFECT OF BETA-PROPIOLACTONE ON SAPROPHYTE MICROORGANISMS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow.
L. V. Malishevskaya, and V. K. Eroshin.
Prikladnaya Bickhimiya i Mikrobiologiya, Vol 8, No 2, p 167-171, March-April 1972. 4 tab, 11 ref.

Descriptors: *Microorganisms, *Growth rates, Bacteria, Yeasts, Fungi, Actinomycetes, Antibiotica (Pesticides), Bactericides, Organic compounds, Inhibition.
Identifiers: *Beta-propiolectone, *Sensitivity, *Saprophytes, Culture media, Chemical concentration, Growth media.

The effect of beta-propiolactone on different saprophytes as well as treatment of liquid cultures on the preparation action was studied. Bacteria, yeasts, fungi and actinomycetes were shown to have different sensitivity to beta-propiolactone. The bactericidal and sporocidal effect of beta-propiolactone was related to the preparation concentration, the treatment duration and the amount of cells in the medium and depended insignificantly on the growth phase of cells. The preparation used in low concentrations (0.001 percent) stimulated the growth of the microorganisms tested. (Holoman-Battelle)
W73-06936

ROLE OF BIOLOGICAL DISTURBANCE IN MAINTAINING DIVERSITY IN THE DEEP SEA,
Scripps Institution of Oceanography, La Jolla, Calif.
P. K. Dayton, and R. R. Hessler.
Deep-Sea Research and Oceanographic Abstracts, Vol 19, No 3, p 199-208, March 1972. 4 fig, 42 ref.

Descriptors: *Deep water, *Sea water, *Grazing, Detritus, Predation, Speciation, Deep-water habitats, Competition, Scavengers, Animal populations, Growth, Limiting factors, Food abundance, Forecasting, Crabs, Crustaceans, Photography, Marine fish.
Identifiers: *Species diversity, *Biological disturbance, Hyalinoecia tubicola, Lycodes, Raja, Antimora rostrata, Somniosus pacificus, Coryphaenoides acrolepis, Eptatretus stoutii, Echinoderms.

The hypothesis is presented that the maintenance of high species diversity in the deep sea is more a result of continued biological disturbance than of highly specialized competitive niche diversification. Detrital food is the primary resource for most of the deep-sea species, but it is suggested that in deposit feeding, most animals would consume available living particles as well as dead. This dominant life-style is called 'cropping'. Predictable cropping pressure on smaller animals reduces the probability of their competitive exclusion and allows a high overlap in the utilization of food sources. Since cropping pressure is in part proportional to the abundance of the prey, proliferations of individual species are unlikely. Through time many species have accumulated in the deep sea because of speciation and immigration. Extinction rate is low because the biological and physical predictability of the environment has suppressed the possibility of population oscillations. Predictability in food supply for smaller deposit feeders is enhanced by the larger, mobile scavengers which consume and disperse large particles of food which fall to the ocean floor. (Holoman-Battelle)
W73-06941

SOME ASPECTS OF POLLUTION IN SOUTHAMPTON WATER,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-06942

INFLUENCE OF SUMMER USE OF A MOUNTAIN WATERSHED ON BACTERIAL WATER QUALITY,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 05B.
W73-06945

RATE AND EXTENT OF INORGANIC PHOSPHATE EXCHANGE IN LAKE SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Program.
W. C. Li, D. E. Armstrong, J. D. H. Williams, R. F. Harris, and J. K. Syers.
Soil Science Society of America Proceedings, Vol 36, No 2, p 279-285, 1972. 2 fig, 3 tab, 28 ref. OWRR B-022-WIS (8). EPA 16010 EGR.

Descriptors: *Inorganic compounds, *Phosphorus, *Lakes, *Sediments, Oxygen, Anaerobic conditions, Iron, Wisconsin, Eutrophication, Aerobic conditions, Cycling nutrients.
Identifiers: Exchangeable sediment phosphorus, Phosphate mobility, Lake Wingra (Wis.), Lake Mendota (Wis.), Lake Tomahawk (Wis.), Lake Little John (Wis.), Calcareous sediments.

Since exchangeable sediment phosphorus may interact with the associated interstitial water and thus influence the phosphorus status of the overlying lake water, investigation was made of the exchangeability of sediment inorganic phosphorus by adding carrier-free P-32 inorganic phosphate to steady-state lake sediment-water systems and measuring the rate and extent of P-32 incorporation into the sediment phase. Effects of calcareous and noncalcareous sediment properties, oxygen status, and addition of inorganic phosphorus on exchangeability were evaluated. Of the total native sediment inorganic phosphorus investigated, exchangeable phosphorus comprised from 19 to 43%. Sorbed added inorganic phosphorus showed approximately the same degree of exchangeability as native inorganic phosphorus in noncalcareous sediments but was more exchangeable in calcareous sediment. Exchangeable phosphorus exhibited exchange rates which were resolved into three separate first-order reactions by a graphical procedure. A major portion of exchangeable native sediment P (45 to 87%) participated in rapid exchange reaction characterized by an exchange rate constant ranging from 7.4 to 46 per hour. That a large pool of sediment inorganic P has a high potential for interaction with the overlying lake water and for biological assimilation is evident. (Jones-Wisconsin)
W73-07022

A TECHNIQUE FOR EVALUATING ALGAL GROWTH POTENTIAL IN ILLINOIS SURFACE WATERS,
Illinois State Water Survey, Urbana.
W-C. Wang, W. T. Sullivan, and R. L. Evans.
Report of Investigation 72, 1973. 16 p, 21 fig, 10 tab, 37 ref.

Descriptors: *Algae, *Eutrophication, *Surface waters, *Illinois, Growth rates, Chemical analysis, Analytical techniques, Sampling, Nitrogen, Phosphorus, Alkalinity, Hardness (Water), Laboratory tests, Incubation, Nutrients, Organic matter, Sewage.
Identifiers: *Algal growth potential.

During a period of 19 months water samples were examined to develop a predictive procedure for assaying the algal growth potential of Illinois surface waters. Twenty-seven incubation runs, composed of 155 samples from 3 lakes, 4 streams, and 2 sewage sources, were evaluated. Algal growth, in filtered samples inoculated with an Illinois River culture, was measured by changes in light absorption, fluorescence of algal pigments, filterable organic and inorganic mass, total alkalinity, and hardness. From correlation analyses, filterable organic mass was the most reliable criterion for quantifying algal growth. Experimental error, expressed as the coefficient of variation, was less than 5 percent. The analysis of nitrogen levels suggests that ammonium nitrogen was the source of nitrogen preferred by the organisms. The algal growth potential (AGP) is defined as the algal or organic mass resulting from a 7-day incubation of a culture grown on a natural water substrate under standardized laboratory conditions and expressed as milligrams of dry organic mass per liter of sample. The mean AGP ranged from 12 mg/liter in Lake Eureka to 82 mg/liter in the Illinois River; for the sewage sources, the range was 120-135 mg/liter. (Woodard-USGS)
W73-07040

A STUDY OF THE DISTRIBUTION AND ACTIVITY OF MICROORGANISMS IN OCEAN WATER,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-07068

INTERACTION OF SALINITY AND TEMPERATURE ON NET PROTEIN SYNTHESIS AND VIABILITY OF VIBRIO MARINUS,
Oregon State Univ., Corvallis. Dept. of Microbiology; and Oregon State Univ., Corvallis. Dept. of Oceanography.
M. F. Cooper, and R. Y. Morita.
Limnology and Oceanography, Vol 17, No 4, p 556-565, July 1972. 6 fig, 23 ref.

Descriptors: *Salinity, *Water temperature, *Proteins, *Viability, *Environmental effects, Limiting factors, Marine bacteria, Aerobic bacteria, Absorption, Amino acids, Inhibition, Thermal stress, Radioactivity techniques, Bioassay, Chemical analysis, Spectrophotometry, Growth rates, Water pollution effects.
Identifiers: *Biosynthesis, *Vibrio marinus, *Ribonucleic acid, Psychrophilic bacteria, Growth media, Culture media, Sample preparation, Proline, C-14, Liquid scintillation.

The relationship of temperature and salinity to protein synthesis was determined for cells of Vibrio marinus. The critical temperature of the lesion in protein synthesis increased with increasing salinity of the growth medium. Protein synthesis was significantly inhibited at 22C at a salinity of 2.5 percent, but not at a salinity of 3.5 percent until the cells were incubated for 20 min at 24C. The thermal lesion did not involve precursor accumulation mechanisms rather than protein synthesis at salinities between 2.5 and 3.5 percent. At 4.0 percent, the uptake of extracellular proline by whole cells was inhibited at 24C and preceded the inhibition of precursor into protein. Total RNA synthesis continued for 50 min at 22C in growth media at salinities between 1.5 and 3.5 percent but at 4.0 percent decreased after 20 min of cell incubation. At salinities between 1.5 percent and 3.0 percent, total RNA synthesis continued at 15 and 22C, but cellular protein synthesis was inhibited by either

temperature or salinity effects. Loss of cell viability at 22 and 25C at salinities of 2.5 and 3.5 percent showed that the onset of cell death occurs simultaneously with thermal inhibition of protein synthesis. (Holoman-Battelle)
W73-07069

ECOLOGICAL-GEOGRAPHICAL REGULARITIES OF HETEROTROPHIC BACTERIA DISTRIBUTION IN THE EQUATORIAL-TROPICAL ZONE OF THE WORLD OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
For primary bibliographic entry see Field 05A.
W73-07071

THE DISTRIBUTION AND ECOLOGY OF THE INTERSTITIAL MEIOFAUNA OF A SANDY BEACH AT WHITESAND BAY, EAST CORNWALL,
Marine Biological Association of the United Kingdom, Plymouth (England). Lab.
For primary bibliographic entry see Field 05B.
W73-07073

FACTORS AFFECTING RESPIRATION RATES OF WINTER FLOUNDER (PSEUDOFLHURONECTES AMERICANUS),
National Marine Water Quality Lab., West Kingston, R. I.
R. A. Voyer, and G. E. Morrison.
Journal of the Fisheries Research Board of Canada, Vol 28, No 12, p 1907-1911, December 1971. 2 fig, 1 tab, 17 ref.

Descriptors: *Respiration, *Marine fish, *Laboratory equipment, Aquatic animals, Water temperature, Instrumentation, Dissolved oxygen, Bioassay, Oxygen requirements.
Identifiers: *Respiration rates, *Winter flounder, Pseudopleuronectes americanus.

Experiments were conducted to determine the factors affecting respiration rates of winter flounder, Pseudopleuronectes americanus. The experiments required subjecting flounder to a factorial arrangement of treatments consisting of two levels of dissolved oxygen and two temperatures. In addition, 16 tests were performed on a barge moored off Jerusalem, Rhode Island where flounder were exposed to two dissolved oxygen levels at 10 and 20C. The apparatus consisted of two separate 500 liter fiberglass tanks set at the two temperatures. From each tank 2 separate water supplies flowed to respirometers and returned to the tanks. One tube from each tank was aerated and the other was deoxygenated by nitrogen gas. Average rates of oxygen consumed by winter flounder at 10C were 35 and 55 mg 02/kg of body weight per hour at 3.5 and 8.6 mg dissolved oxygen (DO)/liter, respectively. At 20C the average rates of oxygen uptake were 70 at 3.2 mg DO/liter and 97 at 6.3 mg DO/liter. Oxygen consumption rates were significantly greater at 20 C than at 10C. In some of the experiments the flounder had reduced oxygen levels with no apparent oxygen-temperature interactions. Data from the Jerusalem experiment indicated respiration rates of flounder increased linearly with weight. (Long-Battelle)
W73-07074

GROWTH INTERACTIONS BETWEEN CHLAMYDOMONAS GLOBOSA SNOW AND CHLOROCOCCUM ELLIPSOIDEUM DEASON AND GOLD UNDER DIFFERENT EXPERIMENTAL CONDITIONS, WITH SPECIAL ATTENTION TO THE ROLE OF PH,
Nijmegen Univ. (Netherlands). Botany Lab.
H. W. Kroes.
Limnology and Oceanography, Vol. 16, No. 6, p 869-879, November 1971. 5 fig, 3 tab, 36 ref.

Descriptors: *Hydrogen ion concentration, *Competition, *Inhibition, *Aquatic algae, Chlorophyta, Phytoplankton, Plant growth, Growth rates, Cultures, Filters, Water pollution effects, Biodegradation, Methodology.
Identifiers: *Chlamydomonas globosa, *Chlorococcum ellipsoideum, *Substrate utilization, *Growth interactions, Culture media.

The influence of Chlamydomonas globosa and Chlorococcum ellipsoideum on each other's growth was studied with two different experimental techniques. The first is a newly developed filter culture method in which two separate cultures of different species are connected via a filtering system through which medium is exchanged while the cells themselves are kept separate. Under these circumstances Chlorococcum inhibits the growth of Chlamydomonas but not vice versa. In the second technique, traditional mixed cultures, Chlorococcum inhibits Chlamydomonas only in unbuffered medium. In medium buffered at pH 8.1 there is a slight stimulation of one or both species. The role of pH in the relation between the species seems therefore to be very important. (Byrd-Battelle)
W73-07082

RESISTANCE, TAXONOMIC POSITION, AND PROTEIN CONTENT OF SOME TROPICAL MARINE ALGAE, (RESISTENZ, TAXONOMISCHE ZUGEHORIGKEIT UND PROTEINGEHALT EINIGER TROPISCHER MEERESALGEN),
Deutsche Akademie der Wissenschaften zu Berlin (East Germany).
V. K. Muntz, and H. Bergmann.
Archiv fur Hydrobiologie, Supplement, Vol. 41, No. 1, p 94-107, May 1972. 3 fig, 4 tab, 13 ref.

Descriptors: *Resistance, *Systematics, *Proteins, *Marine algae, Tropic, Sea water, Chlorophyta, Phaeophyta, Rhodophyta, Water temperature, Thermal stress, Nitrogen compounds, Osmotic pressure.
Identifiers: *Chemical composition, Enteromorpha spp, Ulva lactuca, Cladophora crispula, Codium isthmocladum, Penicillus capitatus, Dasycladus vermicularis, Caulerpa racemosa, Ceramium spp, Polysiphonia spp, Rhizoclonium riparium, Batophora cerstedi, Padina sanctae-crucis, Dictyota dichotoma, Dictyota batayresii, Catenella repens, Caloglossa lepieuri, Ceramium tenuissimum, Ceramium nitens, Ceramium rubrum, Galaxaura obtusata, Gigartina acicularis, Hypnea musciformis.

During 1968, some tropical marine algae, belonging to the Chloro-, Phaeo- and Rhodophyta, were investigated with respect to their resistance to extreme temperatures and osmotic stress as well as with respect to their content of some fractions of nitrogen compounds. In accordance with earlier publications of other authors, it was found that the members of Phaeophyta had a lower crude protein content than that of the Chloro- and Rhodophyta. One important reason for this difference is the low level of TCA-soluble nitrogen compounds in the species of Phaerophyta investigated. Ten of the species used as objects of investigations about resistance were identical with that used by Biebl (1962) in his work about marine algae of Puerto Rico. It was possible to confirm his results principally and enlarge the list of tropical marine algae tested with respect to their plasmatic resistance. There was a parallelism of high content of crude protein with high plasmatic resistance and vice versa. One cannot decide without further experimental work, whether there exists a real correlation between these two facts or not. (Holoman-Battelle)
W73-07083

ECOLOGY OF THE CLADOCERA OF THE NORTH ATLANTIC AND THE NORTH SEA, 1960-1967,
McGill Univ., Montreal (Quebec). Marine Sciences Centre.
W. W. C. Gieskes.
Netherlands Journal of Sea Research, Vol. 5, No. 3, p 342-376, 1971. 21 fig, 32 ref.

Descriptors: *Ecology, *Ecological distribution, *Atlantic Ocean, *Animal populations, *Environmental effects, Waterfleas, Crustaceans, Distribution patterns, Bioindicators, Marine animals, Zooplankton, Neritic, Water temperature, Annual succession.
Identifiers: *Cladocera, *North Sea, Arthropods, Seasonal variation, Species density, Evadne nordmanni, Evadne spinifera, Podon leuckarti, Podon polyphemoides, Podon intermedius.

The distributions, and seasonal and annual variations in abundance, of five species of Cladocera are described and analyzed. The material was collected by Continuous Plankton Recorders from 1960 to 1967 inclusive at a standard depth of 10 m in the North Atlantic and the North Sea. Evadne nordmanni and Podon intermedius were neritic and oceanic, Podon leuckarti appeared to be typically neritic, Evadne spinifera typically oceanic, and 'Pondon' polyphemoides indicative of estuarine waters. Species are never abundant as long as the water column is not stratified. This phytoplankton-like dependence on stratification suggests, that Cladocera need near-surface conditions for their successful propagation, both in neritic and in oceanic regions. Cladocera are dispersed very effectively, so that almost as soon as environmental conditions have become suitable, whether in the open ocean or in coastal waters, animals will appear and populations become established. Evadne nordmanni and E. spinifera seemed to be mutually exclusive in all areas, as were Podon leuckarti and P. intermedius. Congeners have different temperature tolerances and different temperature optima. Podon leuckarti and Evadne nordmanni are cool-water species, most abundant in spring and early summer; the larger Podon intermedius and Evadne spinifera are warm-water species. The abundance of species with a similar pattern of seasonal variation in abundance in any given area is influenced by the same combination of environmental factors. The patterns of annual fluctuation in abundance in different areas are increasingly less similar as the geographic distance increases between the areas that are compared. There seems to be no tendency to speciate. (Holoman-Battelle)
W73-07085

GROWTH AND POPULATION MOVEMENTS OF POTAMOPHYLAX CINGULATUS (TRICHOPTERA) LARVAE IN A SOUTH SWEDISH STREAM,
Lund Univ. (Sweden). Dept. of Animal Ecology.
C. Otto.
Oikos, Vol 22, No 3, p 292-301, 1971. 14 fig, 2 tab, 37 ref.

Descriptors: *Caddisflies, *Larvae, *Ecological distribution, *Temporal distribution, Aquatic drift, Life cycles, Bottom sampling, Diel migration, Benthic fauna, Animal populations, Aquatic insects, Natural streams, Density, Growth stages, Water temperature, Flow, Velocity, Depth, Systematics, Seasonal, Streams, Nets, Animal growth.
Identifiers: *Population dynamics, Potamophylax cingulatus, Macroinvertebrates, *Sweden, Population density.

Twenty bottom samples were collected at 4 locations, at 14-day intervals with a Niel bottom sampler covering 0.05 sq m, to measure growth and population drift of caddisfly larvae in a southern Swedish stream. Drift samples were taken at the same time by a fine drift net (25 by 25 cm) placed in the stream for 12-48 hr, depending on the quan-

tity of larvae and detritus present at the moment. Upstream movement traps were constantly used at the localities and the sieves were emptied once a week. Water temperature, velocity and depth were measured during collections. Sample larvae were hand sorted, preserved in alcohol, and identified. Inter-eye distance and bristle numbers on oral, aboral, and lateral sclerites were used for instar determination. Potamophylax cingulatus was the most common species present, having a one year life cycle with 5 larval instars. Seasonal changes in population density and the numbers of drifting and upstream moving larvae differed between localities. The drifting fraction consisted of, on the average, smaller larvae than the benthic population at the same time. Upstream-moving larvae were to more than 99 percent in the final instar. Seasonal increases of locomotory activity led to considerable movements in upstream and downstream directions and were probably related to (1) increased food requirements and (2) the search for suitable pupation places. In addition, a certain amount of accidental drift took place. (Mackan-Battelle)
W73-07090

RED-SPOT DISEASE OF CARP IN DAGESTAN, (IN RUSSIAN),
A. N. Lezina.
Sb Nauchn Soobshch Kafedry Fiziol Cheloveka Zhivotn Zool Biol Khim Dagest Univ. 4. p 111-113. 1970.
Identifiers: *Carp, *Dagestan, Diseases, *Red-Spot disease, USSR.

As a result of an outbreak of red-spot disease in the fish hatchery 'Uitash' in the Dagestan ASSR, the reduction of producers during the spawning season reached 35% and those of carp yearlings reached 70-80%. As a result of therapeutic-preventive measures including 40 mg Biovitin/producer and 500 mg methylene blue/kg of food of yearlings, the mortality decreased but the disease was not eliminated. Preventive work was continued by creating an immune stock of carp producers in association with intraperitoneal injections of levomycetin at 30 mg/kg.--Copyright 1972, Biological Abstracts, Inc.
W73-07097

PHOSPHORUS CYCLING IN AN EELGRASS (ZOSTERA MARINA L.) ECOSYSTEM,
Alaska Univ., College. Inst. of Marine Science.
C. P. McRoy, R. J. Barsdate, and M. Nebert.
Limnology and Oceanography, Vol 17, No 1, p 58-67, January 1972. 8 fig, 2 tab, 21 ref.

Descriptors: *Absorption, *Phosphates, *Cycling nutrients, Ecosystems, Root systems, Water analysis, Metabolism, Plant growth, Nutrients, Radioactivity techniques, Sediments, Water pollution sources, Sea water, Aquatic soils, Leaves, Connate water, Water sampling, Bottom sampling, Path of pollutants, Chemical analysis, Biodegradation, Filters, Phosphorus radioisotopes, Marine plants, Cores.
Identifiers: *Zostera marina, *Excretion, *Phosphorus cycle, Orthophosphates, Izembek Lagoon, Eelgrass, Stems, Macrophytes.

A mechanism of phosphorus transfer from the sediment to water via eelgrass (Zostera marina) is documented and the importance of this pathway in the phosphorus cycle of an ecosystem dominated by eelgrass is evaluated. Whole eelgrass turions were collected and incubated in bowls containing filtered lagoon water to which a carrier-free P-32 tracer was added. After a 20-hour incubation, the plants were analyzed for P-32 activity with a gas flow detector; phosphorus uptake was then calculated from the observed activity in the plant material and initial specific activity of the solutions. Rates of uptake and excretion of phosphorus by both roots and leaves of eelgrass were dependent on the orthophosphate concentration of the medium. In a typical shallow tidal pool dominated by eelgrass, the interstitial reactive phosphorus concentrations of the sediments were as high as 75 microgram-atoms/liter, while in the water they were about 2. The plants absorbed 166 mg P/sq m/day from the sediments, assimilated 104 in the production of fresh eelgrass, and excreted 62 into the water. An amount equivalent to about 41 percent of the reactive phosphorus excreted, or 3 metric tons P/day, was exported from the lagoon into the Bering Sea. These results add a new pathway to the phosphorus cycle for estuaries containing vascular plants. (Byrd-Battelle)
W73-07099

USE OF MULTIVARIATE ANALYSIS TO IDENTIFY FUNCTIONAL COMPONENTS OF THE BENTHOS IN ST. MARGARET'S BAY, NOVA SCOTIA,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 05A.
W73-07100

A SIMPLE CHEMICALLY, DEFINED MEDIUM FOR THE GROWTH OF APHANOMYCES EUTEICHES AND SOME OTHER COMYCETES,
Kentucky Univ., Lexington. Dept. of Plant Pathology.
C. Y. Yang, and C. L. Schoulties.
Mycopathologia et Mycologia Applicata, Vol 46, No 1, p 5-15, January 1972. 4 fig, 3 tab, 14 ref.

Descriptors: *Plant growth, *Aquatic fungi, *Pathogenic fungi, Calcium, Water, Amino acids, Hydrogen ion concentration, Biodegradation, Water pollution sources, Pollutant identification, Plant physiology, Inhibition, Nutrient requirements, Sulfur, Nitrogen, Carbon, Chlorides, Magnesium compounds, Potassium compounds, Phosphates, Aqueous solutions, Growth rates, Calcium chloride.
Identifiers: *Aphanomyces euteiches, *Oomycetes, *Growth media, Culture media, Substrate utilization, Chemical composition, Aphanomyces leavis, Aphanomyces stellatus, Achlya ambisexualis, Glutathione, D-gluocose, DL-asparagine, Dithiothreitol, Glutamic acid, Aphanomyces astaci, Phythium debaryanum, Phythium altimum, Phythium irregulare, Pythium polymorphon.

A chemically-defined medium composed of glutathione, D-glucose, DL-asparagine, calcium and magnesium chlorides, and monobasic and dibasic potassium phosphates supported growth of several species of filamentous fungi which include seven isolates of Aphanomyces euteiches and single isolates of A. leavis, A. stellatus, Achlya ambisexualis and several species of Pythium. Some growth occurred if a stoichiometric equivalent of the amion acids contained in glutathione were substituted for it. Dithiothreitol, a compound which keeps glutathione in the reduced form, inhibited growth of A. euteiches at the concentrations tested. Replacement of the medium with a solution of known ionic composition caused the fungal colonies to produce and release zoospores and to produce oospores. (Byrd-Battelle)
W73-07103

ROLE OF BIOLOGICAL PURIFICATION PONDS IN ENRICHING THE OXYGEN CONTENT OF WATER. (IN RUSSIAN).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzhaniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenia i Inzhenernoi Gidrogeologii, Moscow (USSR).
I. D. Rodziller, and V. M. Zotov.
Gig Sanit. Vol 36, No 10, p 110-112. 1971.
Identifiers: *Oxidation, Oxidation lagoons, *Oil wastes, *Oxygen, *Photosynthesis, Waste water treatment.

Samples of water taken from a biological pond, with 3 sections for additional purification of waste water from a petroleum refining plant, were studied. The effect of photosynthesis on the O2 regime, daily destruction of organic pollution and total biochemical O2 requirements were determined with the samples. The pond successfully dealt with the problem of enriching the water with O2, increasing its content in the given case from 0.4-8.3 mg/l. Copyright 1972, Biological Abstracts, Inc.
W73-07116

TRANSFER OF CESIUM-137 FROM FISH TO THE PREPARED DISH DURING COOKING (IN RUSSIAN),
Ministerstvo Zdravookhraneniya SSSR, Moscow. Institut Biofiziki.
For primary bibliographic entry see Field 05B.
W73-07132

EFFECT OF SEWAGE COMING INTO SARATOVSK RESERVOIR FROM BIOLOGICAL PURIFYING INSTALLATIONS OF SYNTHETIC RUBBER PLANT IN CITY TOL-'YATTI (USSR), ON MICROBE POPULATION OF THE BODY OF WATER. I. (IN RUSSIAN),
S. N. Bukovskaya, M. A. Skripkina, and M. K. Shpagina.
Sb Nauchn Tr Kuibyshev Nauchno-Issled Inst Gig. 6, p 23-25. 1971.
Identifiers: *Water pollution effects, *Industrial wastes, *Bacteria, Biology, *Dysentery, Enterovirus, Reservoirs, Rubber production, Saratovsk, Sewage, Shigella sonnei, Tolyatti, USSR.

Dysentery bacteria was found in 4 of 10 samples of discharge from the purifying installation (PI), in 3 of 10 samples taken after biological purification and secondary sedimentation, and in 5 of 9 cases after disinfection. Shigella sonnei was also found in mud samples. Enteroviruses were found in 42.5% of the samples. The amount isolated in samples after mechanical purification was higher in comparison with samples of PI discharge. Intestinal bacteriophages were isolated in 62.5% of sewage samples, in 84.6% of the discharge samples, and in 58.6% and 57.1% of sewage samples after biological purification and disinfection of discharge, respectively. Bacteriophages, able to lyse S. sonnei and S. flexneri, were found in 35.8% nd 27.9% of all cases, respectively. Chlorination was not observed in all cases and additional pollution of discharge by mud microflora was noted.--Copyright 1972, Biological Abstracts, Inc.
W73-07143

A COMPARATIVE EVALUATION OF THE TOXIC EFFECT OF INDUSTRIAL DISCHARGE OF THE SYNTHETIC RUBBER PLANT IN TOL-'YATTI ON INTESTINAL MICROFLORA, (IN RUSSIAN),
L. I. Bedareva, E. V. Rabyshko, and S. N. Bukovskaya.
Sb Nauchn Tr Kuibyshev Nauchno-Issled Inst Gig. 6, p 26-28. 1971.
Identifiers: *Industrial wastes, *Waste water treatment, *Sewage treatment, Bacteria, E. coli, Intestinal microflora, Rubber production, Tolyatti, Toxicity, USSR, Viruses.

A joint biological purification of industrial discharge (ID) and domestic agricultural discharge was carried out in the purifying installation of the USSR synthetic rubber plant. Measures to improve ID purification did not decrease the toxicity of the sewage to intestinal microflora. The toxic effect of ID of the plant was determined to a significant level by the admixture of sewage from 1 shop. The bacteriophage, able to lyse Escherichia coli, was most resistant to the ID. It surpassed enteroviruses and intestinal bacteria in resistance.--Copyright 1972, Biological Abstracts, Inc.
W73-07144

5D. Waste Treatment Processes

PARK DEVELOPMENT WITH WET DIGESTED SLUDGE.
Seattle Metropolitan Municipality, Wash.

Available from the National Technical Information Service as PB-217 878, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency, Report EPA-R2-73-143, February 1973. 63 p, 16 fig, 2 tab, 9 ref. EPA Project 17070 ENP. WPRD-180-01 (R) 10-68.

Descriptors: *Sludge digestion, *Landfills, *Centrifugation, *Dewatering, Evapotranspiration, Leaches, *Washington, Water treatment, Recycling, Water reuse, *Land reclamation, Waste water treatment, Sludge treatment, Waste disposal, Parks.
Identifiers: Seattle.

A four year study progressing from laboratory research to full scale demonstration project was conducted by the Municipality of Metropolitan Seattle (METRO) and the University of Washington Department of Civil Engineering to demonstrate the use of digested sewage sludge to reclaim seashore land. A 400 gpm centrifuge was used to dewater digested sewage sludge with a normal feed consistency of 3 to 3.5 percent solids by dry weight. Approximately 10-15 tons day of centrifuge cake was produced and placed in a diked area to reclaim land for park development. If the cake contains less than 50 percent water, a stable fill can be achieved. Design equations were developed to predict the settlement and drying of such sludge fills. No conclusive data could be developed within the allotted time that would insure that the public could safely use such a fill from the health standpoint. Land reclamation costs, in the intertidal zone using digested centrifuge sludge will exceed $50 per ton of dry sludge if environmental impacts are properly controlled. (EPA abstract)
W73-06522

WASTE HEAT UTILIZATION IN WASTEWATER TREATMENT,
URS Research Co., San Mateo, Calif. Environmental Systems Div.
F. J. Agardy, M. Fields, and M. Staackmann.
Available from the National Technical Information Service as PB-217 880, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency, Report EPA-R2-73-165, January 1973. 99 p, 18 fig, 28 tab, 168 ref, 5 append. EPA Project 17090 GAF.

Descriptors: *Waste water treatment, *Cost-benefit analysis, *Activated sludge, Clarification, Chlorination, Heat transfer, Tertiary treatment, Reverse osmosis, Ion exchange, Adsorption.
Identifiers: *Waste heat utilization, Heat quantity, Carbon adsorption.

The technical and economic feasibility of using waste heat to improve conventional and advanced wastewater treatment processes was investigated. Important sources of waste heat were identified and the effects of increased temperature on wastewater treatment processes were explored. A cost/benefit analysis indicated favorable application of waste heat in conventional wastewater treatment plants adjacent to heat sources where at least treatment is employed and the capacity is greater than 5 MGD. Benefits were also shown in advanced treatment processes of reverse osmosis, carbon adsorption and ion exchange. (EPA)
W73-06524

GREENBELT IRRIGATION - PHASE 2,
California Univ., Riverside. Dept. of Plant Sciences.
W. D. Kesner, A. R. Berg, and L. R. Green.
Available from the National Technical Information Service as PB-218 240, $3.00 in paper copy, $0.95 in microfiche. California Water Resources Center, Davis, Contribution No 135 (1972), 22 p, 6 fig, 3 tab. OWRR B-119-CAL (2). 14-31-0001-3258.

Descriptors: Sewage effluent, Groundwater, *Waste water disposal, Irrigation systems, *Water reuse.
Identifiers: *Maloney Canyon (Calif), Lake Arrowhead (Calif), San Bernardino National Forest, *Greenbelts, Firebreaks.

Cooperative project between US Forest Service, University of California, Lake Arrowhead Sanitation District and San Bernardino County Flood Control District studied greenbelts irrigated with sewage effluent as a new and perhaps less costly means of reducing wildfire hazards, while disposing of waste water and recharging groundwater reservoirs in the mountain regions. Topics include construction and testing of irrigation system and controls for the study plots; planting of replicated experimental plots; analyses of 4 soil types; preparation of experiments on build-up and movement in the soil of nitrates, phosphates, etc. found in the waste water; and soil microbiology tests. (See also W72-04898 and W73-06526)
W73-06525

ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF GREENBELT IRRIGATION, (PHASE 3),
California Univ., Riverside. Dept. of Plant Sciences.
V. B. Youngner, W. D. Kesner, A. R. Berg, and L. R. Green.
Available from the National Technical Information Service as PB-218 241, $3.00 in paper copy, $0.95 in microfiche. California Water Resources Center, Davis, Contribution No 140, 1972. 77 p, 12 fig, 22 tab. OWRR B-134-CAL (3). 14-31-0001-3559.

Descriptors: *Greenbelts, Sewage effluent, *Chaparral, *Vegetation effects, *Waste water disposal, *Water reuse, Irrigation effects, Rates of application.
Identifiers: *Maloney Canyon (Calif), Lake Arrowhead (Calif), San Bernardino National Forest, Firebreaks, *Greenbelts.

Cooperative project between US Forest Service, University of California, Lake Arrowhead Sanitation District and San Bernardino County Flood Control District to study greenbelts irrigated with sewage effluent as a new and perhaps less costly means of reducing wildlife hazards, while disposing of waste water and recharging groundwater reservoirs in the mountain regions. Results indicate creation of greenbelts through irrigation with waste water to be highly feasible. Moisture content of chaparral maintained above critical fire level during dry season by irrigation, but has increased chaparral growth. Wild and introduced grasses highly favored by waste water irrigation; replacement of chaparral by grasses may be very effective in retarding spread of wildfires. High irrigation rate - 3 inches or more of water per week - appears necessary to have significant effect on vegetation or soil moisture. Purification of waste water by spray irrigation shows promise. Chemical analyses of soil moisture at 4 ft. showed high degree of removal of some of the most serious pollutants. (See also W72-04898 and W73-06525)
W73-06526

DESIGN OF WASTEWATER TREATMENT SYSTEMS TO SATISFY EFFLUENT QUALITY REQUIREMENTS BASED ON INTENDED USE,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
A. W. Lawrence.
Available from the National Technical Information Service as PB-217 885, $4.85 in paper copy, $0.95 in microfiche. Technical Report No 33, Sept 1971. 81 p, 9 fig, 17 fig, 51 ref, 2 append. OWRR A-016-NY (1). 14-01-0001-1400, 14-01-0001-1852, 14-31-0001-3032, 14-31-0001-3232.

Descriptors: Water pollution control, *Waste water treatment, *Biological treatment, *Reclaimed water, *Water reuse, Activated carbon, Sewage treatment, Tertiary treatment, Mathematical models, Systems analysis, *Reviews.
Identifiers: Process design, Nitrogen compounds, Physical-chemical systems, Literature reviews.

This study approached wastewater treatment from the rather broad perspective of water reclamation and reuse. In this context the function of a wastewater treatment system is to produce an effluent of a quality consistent with the intended use of the reclaimed water. The overall objective was to provide an information base for implementing this approach to wastewater treatment. Thus this study consisted of: (1) a literature review to determine the water quality requirements for each actual and potential use of reclaimed water; (2) a reevaluation of existing wastewater treatment processes and systems to develop rational design approaches; and (3) laboratory scale evaluation of new processes and unexplored aspects of existing processes. In general, the literature revealed that in the United States (1971) the greatest potential for direct water reuse appears to be in industry and agriculture. The process research phase of this study was concerned with biological suspended growth processes, nitrogen removal, and physical-chemical systems. There is no foreseeable equilibrium to be attained in the level of wastewater treatment required because the old problems (organic pollutants) intensify due to population and industrial pressures while new problems emerge continually (eutrophication and heavy metals). Water reclamation and reuse will become a significant factor in water resources management. (Lawrence-Cornell)
W73-06529

REPORT ON WASTES FROM MISSOURI AND MISSISSIPPI RIVER WATER TREATMENT PLANTS SOURCES QUANTITIES CHARACTERISTICS INPACT ON WATER QUALITY.
Black and Vetach, Kansas City, Mo.
For primary bibliographic entry see Field 05F.
W73-06595

WE DON'T WASTE WASTES,
Saint Petersburg Street Dept., Fla.
L. A. Dove.
The American City, Vol 87, No 11, p 68-70, November 1972, 3 photo.

Descriptors: *Waste water disposal, *Waste water treatment, *Sludge disposal, *Florida, *Sludge, *Recycling, *Soil treatment, Water quality control, Water spreading, Irrigation practices, Groundwater recharge, Fertilizers, Water reuse.
Identifiers: *Saint Petersburg (Florida).

Efforts of St. Petersburg, Florida to utilize liquid wastes, especially wastewater treatment sludge, rather than release them to the waterways are described. A program has been developed where the sludge is applied at regular intervals to golf courses, parks, parkways, and other large public areas as fertilizer. Experiments are also being conducted on a test plot to create topsoil from the locally prevalent sandy soils through the repeated application of sludge. The test area leachate is collected through drains, tested, and treated if necessary. Plans are also being made to investigate the feasibility of this spray irrigation system as a source of groundwater recharge. (Davis-Chicago)
W73-06603

INTEGRATED WATER SUPPLY AND WASTE WATER DISPOSAL ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06608

SUMMARY OF THE DRAFT ENVIRONMENTAL ASSESSMENT, POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY.
VTN, Las Vegas, Nev.

Report prepared for the Las Vegas Water District, Las Vegas, Nevada, August 1, 1972, 13 p, 1 fig, 2 tab, 3 photo.

Descriptors: *Waste water disposal, *Waste water treatment, *Municipal wastes, *Alternative planning, Management, *Nevada, Water quality, Waste disposal wells, Groundwater recharge, Planning, Environment, Water transfer.
Identifiers: *Las Vegas, Environmental quality, Waste water exportation, Lake Mead, Greenbelts.

The primary objective of the study is the analysis of alternatives to accomplish the elimination of the pollution of Lake Mead from Las Vegas Wash, a wash whose primary source of water is wastewater effluent from the Las Vegas metropolitan area. Five related environmental quality objectives are also considered: (1) to attain a clean desert environment, (2) to maintain the Las Vegas Wash as a permanent riparian environment, (3) to develop additional greenbelts, (4) to optimize the use of water, and (5) to protect the environment from the adverse impacts of construction. Seven possible actions to accomplish wastewater management are discussed: groundwater recharge, complete treatment, return of effluent to the Colorado River, exportation of wastewater, a combination of alternatives, deep well disposal, and no action. The approach utilized to develop the environmental assessment of these actions consisted of describing the present environment, establishing objectives for environmental quality, defining laws and regulations affecting environmental quality, describing the proposed actions, identifying changes in the present environment caused by the alternative actions and relating them to the objectives and constraints, and defining ways of minimizing bad effects and taking advantage of opportunities to create benefits. (Davis-Chicago)
W73-06616

COMPREHENSIVE WATER AND SEWERAGE PLAN FOR DUKES COUNTY (MASSACHUSETTS).
Metcalf and Eddy, Inc., Boston, Mass.

Report prepared for the Dukes County Planning and Economic Development Commission, Edgartown, Massachusetts, January 1972, 114 p, 10 fig, 19 tab, 3 append.

Descriptors: *Water supply, *Sewerage, *Comprehensive planning, Community development, Water demand, Facilities, Public utilities, Groundwater, Alternative planning, Financing, Administration, Political aspects, Legal aspects, *Massachusetts.
Identifiers: *Martha's Vineyard Island, *Sewerage demand, Implementation.

A major purpose is to examine the feasibility of developing water and waste systems to serve a group of municipalities, and to compare such development with the more traditional methods whereby each municipality takes care of its own needs. In these investigations, major emphasis is placed on physical factors and on the pattern of projected development within the study area. Political and legal restraints, such as municipal boundaries, are considered but only as secondary factors. The scope of work for the study includes: (1) estimate of future water and sewerage needs; (2) inventory and evaluation of existing public and investor-owned water and sewerage systems; (3) groundwater favorability study; (4) determination and evaluation of alternative water and sewerage plans and selection of preferred plans for each and (5) recommendations for staging and financing the needed improvements and for the administrative organization necessary to carry out the water and sewerage plans. (Davis-Chicago)
W73-06618

WATER AND SEWER PLAN.
Erie County Metropolitan Planning Commission, Pa.

1970, 114 P, 20 FIG, APPEND.

Descriptors: *Water supply, *Sewerage, *Planning, Population, Water demand, Economics, Financing, Facilities, Public utilities, Water supply development, Urbanization, Land use, *Pennsylvania.
Identifiers: *Erie (Penn).

Essential background examination is presented of population, economics, soils, municipal finance, existing water and sewer systems, utilities, natural resources, land use, agriculture, topography, and water resources necessary to develop an adequate water and sewer plan. Part I discusses natural resources and the effect which available natural resources has on available or needed water and sewer systems. Recommendations are included for necessary further studies for development of new sources of water which will be needed immediately and in the future. Part II is concerned with population including a brief analysis of present population characteristics, density of residence patterns throughout the area, and an explanation of influences and projected trends of these characteristics and patterns. Part III examines the economic condition of the area including a general summary of the present financial condition and economic history of the area as a whole and the general financial condition of local units of government in the area. Part IV provides a summary discussion of residential, recreational, commercial, agricultural, and industrial land uses as these factors relate to present and future water and sewer needs. Part V examines existing public utilities, especially water supply systems, sewerage facilities, and on-lot sewage disposal systems. (Davis-Chicago)
W73-06619

CLARIFYING SYSTEM SEPARATES EMULSIFIED OILS FROM WATER.
Tenco Hydro/Aeroscience, Inc., Chicago, Ill.

Chemical Engineering, Vol 79, No 23, p 72, 74, October 16, 1972. 2 fig.

Descriptors: Equipment, *Separation techniques, *Coagulation, *Oil-water interface, Water pollution treatment, *Water quality control, *Waste water treatment.
Identifiers: *Air flotation, *Clari-float system.

A portable, skid mounted clarifier has been developed for separating emulsified oils from water. The process utilizes a coagulation-separation device based on the ability of pressure injected air to float contaminated coagulants to a location in the apparatus where a sludge sensor can activate an automatic removal pump, thereby cleansing and recycling the system for continued use. The clari-float system requires little head and floor space and extends chemical coagulation and air flotation separation to small-volume oil in water discharges. (Mackan-Battelle)
W73-06673

MICROBIOLOGY OF WASTE TREATMENT,
Environmental Protection Agency, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
C. W. Chambers.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1172-1175, June 1972. 30 ref.

Descriptors: *Waste treatment, *Biota, *Microorganisms, *Activated sludge, *Reviews, Sewage bacteria, Fungi, Protozoa, Biomass, Sewage effluents, Model studies, Sphaerotilus, Coliforms, Sulfur bacteria, Algae, Microbiology.
Identifiers: Zoogloea, Leucothrix, Lincola, Spirulina, Achronema, Corynebacterium nitrilophilus, Geotrichum candidum, Flocculent bacteria.

Those references are reviewed which are concerned with the microorganisms associated with waste treatment. Included in the review are methods for determining the numbers, types, and fate of microorganisms. (Holoman-Battelle)
W73-06681

TEMPERATURE ACCLIMATION IN AEROBIC BIO-OXIDATION SYSTEMS,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
A. H. Benedict, and D. A. Carlson.
Journal Water Pollution Control Federation, Vol 45, No 1, p 10-24, January 1973. 15 fig, 1 tab, 19 ref.

Descriptors: *Temperature, *Waste water treatment, *Activated sludge, Laboratory tests, Bioassay, Growth rates, Bacteria, Organic loading, Settling velocity, Biological treatment, Oxidation, Aerobic conditions.
Identifiers: *Temperature acclimation, Settleability.

Laboratory size activated sludge units were run at three growth temperatures in a continuous flow system. From tests run on these acclimated cultures it was concluded that acclimation of mixed cultures at low temperatures is essentially complete within 2 wk after a shock temperature change of 10 to 15 degrees C. The acclimation time required by mixed cultures at high temperatures (greater than 30 C) is on the order of months. In some cases, gross protozoal activity may yield information on the acclimation of mixed cultures. Insufficient acclimation inhibits the respiration rates of mixed cultures, as compared to the respiration rates of acclimated cultures. The response of unacclimated cultures to changes in organic loading (F:M ratio) is of the same shape as the response of acclimated cultures; only the magnitudes of the responses differ. Sludge settleability, as measured by gross settling rates and SVI, is not adversely affected by operating temperatures between 4 and 32 C. Within the temperature range 4 to 32 C, the performance efficiency of bio-oxidation systems subjected to low applied organic loadings is not affected to the same degree as is the respiration rate of the mixed culture in the system. (Oleszkiewicz-Vanderbilt)
W73-06682

DESIGN OF CROSS-FLOW COOLING TOWERS AND AMMONIA STRIPPING TOWERS,
IIT Research Inst., Chicago, Ill.
For primary bibliographic entry see Field 08A.
W73-06695

CANALS COOL HOT WATER FOR REUSE,
S. S. Miller.
Environmental Science and Technology, Vol 7, No 1, p 20-21, January 1973. 1 fig.

Descriptors: *Cooling water, *Electric power production, Water reuse, Hydraulic engineering, Nuclear powerplants, Design, Water quality control, Water pollution, Thermal pollution, Environment, Canals, Land management, *Florida.
Identifiers: *Biscayne Bay.

The Turkey Point electrical power generating plant of the Florida Power and Light Company is discussed as a model for designing with an awareness of the local environment. Located in a marshy area along Biscayne Bay, the facility now meets the 95 F effluent temperature restriction of Dade county, with a 6 mile long canal which allows the waste water to cool before being issued into the bay. Now under construction is a 168 mile long canal system which will allow water to cool enough so that it can be reused in cooling the generators. Relatively small amounts of makeup water will have to be taken from the bay and occasionally the system will need to be flushed. Although other types of cooling were considered, none were found feasible for the Turkey Point area. This solution, costing an additional $30 million, is considered admirable in its compatibility with the local environment. (Jerome - Vanderbilt)
W73-06701

TREATMENT OF SUGAR FACTORY EFFLUENTS IN RELATION TO THE TOLERANCE LIMIT OF BIOCHEMICAL OXYGEN DEMAND,
D. R. Parashar.
Indian Sugar, p 879-885, March, 1969.

Descriptors: *Waste water treatment, *Industrial wastes, *Effluents, *Waste water treatment, *Biochemical oxygen demand, Cost analysis, Cost comparison, Biological treatment, Aerobic treatment, Anaerobic treatment, Lagoons, Water pollution, Water pollution control, Food processing industry.
Identifiers: *Sugar factory effluents.

The volume of effluents and wastes discharged from a sugar factory has a considerable bearing on the method of treatment and ultimately on the disposal either for agricultural purposes or for mixing with rivers and streams. One method used is self-oxidation and is based on the concept of decomposition of organic matters by anaerobic oxidation in the ponding system and by aerobic oxidation in long channels. Another method is the lagooning process which is the treatment of effluents based virtually on the ponding system. Both of these methods require large areas of land, are not fast, produce odors, are unsuitable for effluents with initial high BOD and the risk of seepage is always present. The biological treatment process has the advantage of economy of space and speed, but becomes very costly on account of the huge volume of non-polluted water that is required for diluting the effluent discharged. (Smith-Texas)
W73-06739

MAGNETIC RECLAMATION: A GROWING TREND IN SOLID WASTE MANAGEMENT.

Public Works, Vol 103, No 9, p 103-105, September, 1972. 1 tab.

Descriptors: *Waste disposal, *Ultimate disposal, *Waste treatment, *Recycling, Cost analysis, Incineration, Powerplants, Pilot plants, Waste dumps, Wastes.
Identifiers: *Magnetic separation, Power production costs.

Magnetic separation can be used with all types of refuse disposal systems including incineration, shredding and sanitary landfill. Magnetic metal recovery pilot operations in several cities are described. The goals of these programs are to dispose of refuse at relatively low cost, effect savings of natural resources, and reduce power production costs by using large quantities of the refuse in existing power plant boilers. (Smith-Texas)
W73-06740

WASTEWATER RESEARCH STATION,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
R. Laak, and L. Hultgren.
Water and Sewage Works, Vol 119, No 10, p 70-72, October, 1972. 5 fig, 3 ref.

Descriptors: *Waste water treatment, *Waste treatment, *Sewage disposal, Waste disposal, Septic tanks, Absorption, Design criteria, Research and Development, Soils, Organic loading.
Identifiers: *Household disposal systems.

A wastewater research station was constructed recently by the Civil Engineering Department of the University of Connecticut to study individual household disposal systems in unsewered areas, specifically the septic tank and soil absorption processes. The design is comprised basically of ten 8 ft. x 4 ft. x 4 ft. soil chambers fed septic tank effluent which can be varied in flow and monitored to provide a desired loading rate. (Smith-Texas)
W73-06742

PLANT SCALE DEMONSTRATION OF THE Z--M PROCESS FOR WASTEWATER TREATMENT,
Envirotech Corp., Brisbane, Calif.
M. M. Zuckerman, I. E. Joya, and T. M. Zaferatos.
Water and Sewage Works, Vol 119, No 10, p 87-91, October, 1972. 6 fig, 2 tab, 5 ref.

Descriptors: *Waste water treatment, Water treatment, *Tertiary treatment, Activated sludge, Organic matter, Coagulation, Suspended solids, Water quality, Water quality control, Activated carbon, Treatment facilities, Hydrolysis.
Identifiers: *Lake Tahoe, *Hydrolysis-adsorption process.

The South Lake Tahoe demonstration of the hydrolysis-adsorption process produced significant results, although the test period was of relatively short duration. A product water of tertiary quality was obtained without activated sludge treatment in the process sequence. When a primary effluent was treated by hydrolysis of the soluble organic material rather than by coagulation for suspended solids removal, a higher quality effluent was obtained. A water superior to that produced by high quality advanced treatment was produced by the hydrolysis-absorption process when applied to an activated sludge effluent. In addition, activated carbon at the end of its service cycle for adsorbing organics from an activated sludge effluent had a reserve capacity to absorb organics from a hydrolyzed effluent. (Smith-Texas)
W73-06743

CLARIFICATION-ADSORPTION IN THE TREATMENT OF MUNICIPAL AND INDUSTRIAL WASTEWATER,
Calgon Corp., Pittsburgh, Pa. Water Management Div.
D. G. Hager, and P. B. Reilly.
Journal Water Pollution Control Federation, Vol 42, No 5, Part 1, p 794-800, 1970, 9 tab, 4 ref.

Descriptors: *Waste water treatment, Water treatment, *Biochemical oxygen demand, *Municipal wastes, *Activated carbon, Flocculation, Settling basins, *Adsorption, Clarification, Biological treatment, Laboratory tests, Cost analysis.
Identifiers: *Clarification-adsorption process.

The technical and economic feasibility of treating raw municipal wastewater with granular activated carbon after preliminary chemical flocculation and settling to reduce suspended solids has been confirmed by many laboratory and field evaluations. The economics of the clarification-adsorption process were compared to the activated sludge process on a total system basis. The clarification-adsorption approach was shown to be considerably less costly to build has lower operating cost and requires one seventh the amount of surface area. For the same initial cost as a biological plant designed to remove 90% BOD, the clarification-adsorption process can be operated to provide 95% BOD removal with only a slight annual cost increase. (Smith-Texas)
W73-06745

REMOVE ORGANICS FROM FEEDWATER MAKEUP,
Vermont Yankee Nuclear Power Corp., Rutland.
G. D. Weyman.
Power, Vol 16, No 7, p 33-34, July 1972. 1 fig.

Descriptors: *Coagulation, *Activated carbon, Water treatment, *Waste water treatment, Ion exchange, Resins, Organic matter, Treatment facilities, Separation techniques, Conductivity, Nuclear reactors, Filtration, Anion exchange, *Connecticut River, Filtration.
Identifiers: *Vermont Yankee Nuclear Power Station.

Coagulation and activated carbon filtration methods for removing organics from raw water are not always completely effective for producing the high quality feedwater required in today's nuclear reactors and boilers. Conventional gel-type anion exchange resins have limited capacity for certain high-molecular-weight compounds. However, one type of resin that allows large organic molecules to be captured has a porous, macroreticular structure rather than a gel-type structure. This weak-base, anion-exchange resin gives good release of adsorbed organics when regenerated with sodium hydroxide. Moreover, it can be used in the same vessel with a conventional strong-base anion-exchange resin, i.e. a stratified-bed system. The stratified-bed system is used at Vermont Yankee Nuclear Power Station, where it had been impossible to produce waterwith a conductivity of 0.1 micromho or less with a strong-base anion exchanger alone. (Murphy-Texas)
W73-06747

ENGINEERING ASPECTS OF THE DISPOSAL OF UNUSED PESTICIDES, PESTICIDE WASTES, AND PESTICIDE CONTAINERS,
Mississippi Agricultural and Forestry Experiment Station, State College.
F. L. Shuman, Jr., B. J. Stojanovic, and M. V. Kennedy.
Journal of Environmental Quality, Vol 1, No 1, p 66-70, January-March 1972. 4 fig, 11 ref.

Descriptors: *Pesticides, *Incineration, *Ultimate disposal, *Waste disposal, Pilot plant, Treatment facilities, Laboratory tests, Design criteria, Waste treatment.
Identifiers: *Pesticide wastes, *Pesticide containers.

Preliminary research on various methods of disposal of pesticides and containers indicates that incineration offers the greatest potential for rapid reduction of these materials. Work has been done in the laboratory on model incinerators and design criteria have been established for a pilot plant and a full scale plant for incineration and disposal of pesticides and containers. The primary objective is to provide a safe method for disposal of hazardous materials generated in the future and to provide a means for removing existing potentially hazardous materials from the environment. (Smith-Texas)
W73-06752

CONVERSION OF SOLID WASTE TO LIQUID FUEL,
Worcester Polytechnic Inst., Mass. Dept. of Chemical Engineering.
A. H. Weiss.
Textile Research, Vol 42, No 9, p 526-533, September, 1972. 3 fig, 5 tab, 51 ref.

Descriptors: *Solid wastes, *Waste disposal, *Ultimate disposal, *Waste water treatment, *Energy, *Fuels, *Cellulose, Oil, Hydrogenation, Hydrogen, Oxygen, Chemical reactions.
Identifiers: *Fuel conversion.

A concept of an ultimate process in which cellulosic solid waste is used both to produce process hydrogen by the water-gas shift reaction and to provide the raw material for conversion to oil is developed and discussed. An economic process will probably use a reaction medium of cellulosics slurried in oil and will require a catalyst that permits operations at pressures below one thousand psig. At present, pyrolysis processes are capable of producing a tar containing 20 weight percent oxygen with a heating value of 12,000 BTU's per pound and an equal yield of char. Hydrogenation processes have the potential of producing practically oxygen-free oil approaching 18,000 BTU's per pound without the char by-product. (Smith-Texas)
W73-06753

ANAEROBIC DIGESTION OF SOLID WASTES,
California Univ., Berkeley.
S. A. Klein.
Compost Science, Vol 13, No 1, p 6-11, January-February 1972. 2 fig, 4 tab, 1 ref.

Descriptors: *Anaerobic digestion, *Solid wastes, *Sewage sludge, *Digestion, Cellulose, Sludge digestion, Gases, Methane, *Waste water treatment, Sewage treatment, Organic wastes, Fuels.
Identifiers: *Volatile solids, Gas production.

Anaerobic digestion was used to treat mixtures of organic solid waste and sewage sludge. Coarsely shredded refuse digested with reasonable efficiency. Furthermore, volatile solids destruction was 66.8%, while the removal of volatile solids was 82.8%. Cellulose destruction was nearly 80% and cellulose removal was 94%. Total solids removal was 74.2% whereas, total solids destruction was only 39.8%. Gas production was lower than that normally obtained in sludge digestion. Gas composition indicated a severe drop in methane content to about 55% during the first 3 months of digestion, but an increase to approximately 70% took place in the final months. The digestion cultures showed no evidence of toxicity. (Smith-Texas)
W73-06754

BIOLOGICAL TREATMENT OF POULTRY MANURE REDUCES POLLUTION,
J. B. Patel, and R. B. Patel.
Compost Science, Vol 12, No 5, p 18-20, September/October, 1971. 2 fig.

Descriptors: *Anaerobic digestion, *Poultry, *Waste treatment, *Waste disposal, *Ultimate disposal, Sludge digestion, Digestion, Fuels, Agriculture, Fertilizer, *Recycling, Farm wastes.
Identifiers: Digestor gas, *India.

The anaerobic digestion process of poultry wastes at Papcock Farms in India is described. The digestion process produces a fertilizer that can be applied to agricultural land without creating odors, surface water and soil pollution or fecal-borne disease. The gas produced during the digestion process is used as a fuel to run the incubator, brooders, and a small gas engine, which is used to drive the food mixer and other equipment. The gas is also used for cooking. (Smith-Texas)
W73-06755

THE COPPERMILLS WORKS OF THE METROPOLITAN WATER BOARD.

Water and Water Engineering, Vol 76, No 918, p 277-290, August, 1972. 9 fig, 4 tab.

Descriptors: *Waste water treatment, *Treatment facilities, Filtration, Filters, Chlorination, Pumps, Water treatment, Cost analysis, Economics.
Identifiers: *Coppermills works, *London.

A filtration works and pumping station was formally opened on 3 July, 1972, at Coppermills Road, London, England. The plant has a nominal output of approximately 180,000,000 gallons per day derived from the rivers Lee and Thames. The plant is comprised of 24 primary filters, 34 slow sand filters, a chlorination plant, a contact and balancing tank, high lift and low lift pumping machinery, mains and ancillaries and a central administrative block and other buildings. The total cost estimation of the work is 9,343,607 pounds. (Smith-Texas)
W73-06756

DETECTION AND GEL CHROMATOGRAPHY OF CARBOHYDRATES IN PULP MILL EFFLUENTS,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 05A.
W73-06757

MALTING EFFLUENTS,
Newcastle-upon-Tyne Univ. (England).
P. C. G. Isaac.
Effluent and Water Treatment Journal, Vol 9, No 11, p 597-603, November, 1969. 4 fig, 7 tab, 9 ref.

Descriptors: *Waste water treatment, *Waste treatment, Industrial wastes, *Biological treatment, *Activated sludge, *Cost analysis, Cost comparison, Waste disposal, Sewage treatment, Treatment facilities.
Identifiers: *Malting wastes, Shock loads.

Malting effluents, a strong deeply colored liquid which may contain much suspended solids, can readily be treated at a local-authority sewage works. The admixture of domestic sewage helps to improve the BOD-nitrogen ratio. The two principal biological processes which may be used for the treatment of malting waste are bacteria beds and activated sludge. The bacteria bed is inherently better able to withstand the variations of load which are inevitable with a batch process such as malting, and activated sludge, in normal sewage practice, is used only at the larger treatment facilities. A cost analysis is given for treatment and disposal of malting effluents. (Smith-Texas)
W73-06758

INFLUENCE OF HIGH CONCENTRATIONS OF WASTE PAPER ON AEROBIC SLUDGE DIGESTION,
West Virginia Univ., Morgantown.
A. J. Tarquin.
Available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Michigan 48106. Order No 70-15, 268, Price: $6.60; microfilm $4.00. Ph. D. Dissertation, 136 p, 1969.

Descriptors: *Sludge digestion, *Aerobic treatment, *Aerobic conditions, Analytical techniques, *Aeration, *Waste treatment, Waste water treatment, Sludge treatment, Solid wastes, Sewage treatment, Treatment facilities, Waste disposal.
Identifiers: *Waste paper, Sludge-paper mixtures.

The purpose was to determine the effects of selected concentrations of waste paper on aerobic sludge digestion. A sludge-paper mixture, with newspaper ground to 0.5 mm and added in concentrations of 10, 25, 50 and 100%, was aerated for 10-, 15-, 30- and 60-days, at 15 degree, 25 degree and 37 degree C. After equilibrium conditions were established, various physical and chemical tests were conducted to determine the degree of stabilization attained. After a statistical analysis of the resulting data, it was concluded that at least partial disposal of the organic portion of solid waste materials is possible through the sewage treatment system, if the facilities are adequately designed. (Smith-Texas)
W73-06760

AFLATOXIN FORMATION IN FEEDLOT WASTES AND REMOVAL DURING WATER TREATMENT PROCEDURES,
Colorado State Univ., Ft. Collins.
D. A. Hendrickson.
Available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Michigan 48106, Order No.:71-16, 268. Ph. D. Dissertation, 80 p 1970.

Descriptors: *Farm wastes, *Feedlots, Water pollution, Water pollution sources, Water quality, *Water quality control, Laboratory tests, Chlorination, Aeration, Flocculation, Filtration, *Waste water treatment, Soils.
Identifiers: *Aflatoxin, *Aspergillus flavus.

The possibility exists that aflatoxins, if formed in manure stock piles, might contaminate ground and surface waters through leaching and runoff. However, all soils tested readily removed aflatoxin from aqueous solutions. Aflatoxin contamination of ground waters through leaching from contaminated stock piles is therefore unlikely to occur. The removal or transformation characteristics of aflatoxin during simulated water treatment procedures was studied. These procedures showed the ability to destroy, deactivate, or remove aflatoxin from aqueous solutions. Despite the fact that toxigenic strains of aflatoxins are readily isolated from stock pile manure, major aflatoxins formed under field conditions cannot reach consumers of water that has undergone standard purification procedures. (Smith-Texas)
W73-06761

VIRUS REMOVAL BY CHEMICAL COAGULATION,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 05F.
W73-06763

HAWAII'S ENVIRONMENTAL PLANNING AIMS AT FLEXIBILITY IN SOLID WASTE MANAGEMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
H. M. Theisen, and M. Brown.
Public Works, Vol 103, No 9, p 82-86, September, 1972. 3 fig, 1 tab.

Descriptors: Waste water treatment, *Waste treatment, *Solid wastes, *Waste disposal, *Incineration, *Project planning, Project purposes, Project benefits, Recycling, Treatment facilities, Landfills, Capital costs, Annual costs, Pilot plants, *Hawaii.
Identifiers: *Oahu, Solid waste problems.

Recognizing the particular solid waste problems of Oahu, the city and county initiated a study of these problems. The basic steps used in solid waste planning are: (1) inventory analysis of the existing conditions, (2) forecast of future conditions, (3) development of alternative management plans to meet present and future needs, and (4) selection of the recommended plan. The recommended solid waste management plan reduced incineration facilities and increased use of sanitary landfills for land reclamation; this system costs more overall than other alternatives, but reduces and delays the major capital expenditures required for incineration facilities. Pilot programs will seek and develop methods for the recovery and reuse of materials from solid wastes. Total capital costs for the recommended system would be 44.7 million dollars. (Smith-Texas)
W73-06764

TREATMENT OF OIL REFINERY AND PETROCHEMICAL WASTE WATERS BY THE ACTIVATED SLUDGE PROCESS,
Sumitomo Shipbuilding and Machinery Co. Ltd. (Japan).
H. Ono.
Chemical Economy and Engineering Review, Vol 2, No 3, p 38-44, March, 1970. 4 fig, 4 tab, 16 ref.

Descriptors: *Activated sludge, *Sludge treatment, *Waste water treatment, Waste treatment, Industrial wastes, *Biological treatment, Capital costs, Operating costs, Oil pollution, *Oil wastes, Economics, Treatment facilities.
Identifiers: *Petrochemical wastewaters.

The activated sludge process and its application to treatment of oil refinery and petrochemical waste waters are described. The activated sludge process is used to treat petrochemical waste waters from plants for naptha-cracking, polyester, propylene glycol, nylon, acrylonitrile synthetic rubber, organic acid, etc. Waste water from these plants can be biologically treated more efficiently and more economically at central or joint facilities. Not only will the concentrations of industrial waste waters be uniform, if collected at one point, but substantial savings in construction and operation costs will be possible. It is hoped that efforts will be accelerated to study biological treatment of industrial waste waters on a collective basis. (Smith-Texas)
W73-06765

HYGIENIC EVALUATION OF BIOLOGICAL PONDS IN PRACTICAL TREATMENT OF EFFLUENTS,
Institute of Medical Parasitology and Tropical Medicine, Moscow (USSR).
N. A. Romanenko.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 281-284, January-March, 1971. 5 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Oxidation lagoons, *Digestion tanks, *Sewage treatment, *Waste water treatment, Waste treatment, Irrigation, Water reuse, Sludge disposal, Sludge digestion, Public health.
Identifiers: *USSR, Biological ponds.

Biological ponds are called oxidation or digestion ponds or lagoons in literature published outside the USSR Biological ponds with flowing water connected in series appears to be the most practical use of ponds in various climatic zones of the USSR because this system has the largest output. A method permitting the successful use of biological ponds throughout the year has been developed in the Soviet Union. Effluents are accumulated in biological ponds in winter and after the ice melts, a specially chosen complex of microalgae is introduced resulting in a rapid biological purification of the effluents. The problem of the treatment of effluents and their efficient utilization for irrigation is solved by the inclusion of biological ponds in sewage farm systems. It is obvious however, that the use of such ponds for the treatment of effluents must be rigorously controlled by the public health service. (Smith-Texas)
W73-06775

HYGIENIC EVALUATION OF FINAL ELIMINATION OF PHENOLS FROM EFFLUENTS OF TIE IMPREGNATION FACTORIES,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Zheleznodorozhnoi Gigieny, Moscow (USSR).
A. S. Preobrazhenskaya, and N. I. Sorokina.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 284-285, January-March, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Industrial wastes, *Waste water treatment, *Biological treatment, *Chlorination, Activated sludge, Aeration, Oxidation lagoons, Color, Coal tar coatings, *Phenols, Organic wastes, Effluents, Odor.
Identifiers: *USSR.

Coal and shale oils, the only antiseptics used for wood preservation in factories engaged in the impregnation of railroad ties, possess strong antiseptic properties and have a high content of phenols. A comparison was made of the two effluent treatment systems presently in use in several Soviet factories. The first was the biological method with activated sludge in aeration tanks and the other was by super-chlorination. The effectiveness of biological treatment was confirmed by the absence of the specific antiseptic odor in the purified waters and by the the disappearance of the brownish pink color characteristic of the untreated effluents. Super-chlorination proved to be insufficient as a purifier. The concentration of organic substances was reduced by only 32.2% on the average, and in turn chlorination leaves the effluents with a considerable amount of chlorine, about 22.7 to 48.7 mg/l. (Smith-Texas)
W73-06776

AN AUTOMATIC SAMPLER FOR EFFLUENTS,
For primary bibliographic entry see Field 05A.
W73-06780

ON A NEW BIOLOGIC AGENT FOR NATURAL SELF-PURIFICATION OF WATER BODIES,
Institute of General and Municipal Hygiene, Moscow (USSR).
R. M. Abieva.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos. 4-6, p 87-91, April-June, 1971. 17 ref. Trans. from Gigiena i Sanitariya.

Descriptors: *Bactericides, *Bacteriophages, *Pathogenic bacteria, *Waste water treatment, *Water treatment, Biological treatment, Domestic wastes, Sewage treatment, Pollution abatement, Water quality control, Water pollution, Sea water, *Self purification.
Identifiers: *USSR, *Bdellovibrio bacteriovorus.

The search for biological agents facilitating the processes of self-purification of water from pathogenic microflora and factors affecting this process are of interest in the field of water pollution control. In recent year, the Bdellovibrio bacteriovorus has been extensively discussed in the scientific literature as a microorganism facilitating the self-purification of water. Several experiments were undertaken and the results indicate that the Bdellovibrio is definitely a bactericide. Furthermore, the Bdellovibrio has the advantage over bacteriopahge of not being narrowly specialized. Its high activity with respect to a large group of pathogenic microorganisms, little dependence upon ecological conditions, its prolonged survival, and its widespread geographic distribution, all indicate the importance of Bdellovibrio in biological processes in the self-purification of water. (Smith-Texas)
W73-06781

HYGIENIC EVALUATION OF STANDARD SMALL SEWAGE TREATMENT UNITS,
A. A. Belov.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 4-6, p 282-283, April-June, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Sewage treatment, *Biological treatment, *Treatment facilities, *Waste water treatment, Sludge treatment, Filtration, Sewerage, Sewage effluents, Design criteria.
Identifiers: *USSR, *Tippling chutes, *Decentralized sewerage systems.

Rural populated areas often need decentralized sewerage systems with sewage treatment facilities of a small output. An investigation was conducted of various types of local and small sewage treatment installations with special emphasis placed on those with biologic trickling filters in which the sewage is distributed over the filter surface by tippling chutes. The investigation revealed an unsatisfactory state of the tippling chutes and sludge-packed filters, so that the filtration of sewage was confined to a limited area. Local sewage treatment units with small trickling filters and tippling chutes need changes of design with respect to the distribution of sewage over the surface of filters or else they should be replaced by other installations for the biological treatment of sewage. (Smith-Texas)
W73-06786

EFFECT OF DOSE RATE ON DISINFECTION OF WATER BY GAMMA RAYS,
Academy of Municipal Economy, Moscow (USSR).
V. A. Ryabchenko, and N. M. Elmanov.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 microfiche. Hygiene and Sanitation, Vol 36, Nos. 4-6, p 293-295, April-June, 1971. 1 tab, 2 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Disinfection, *Waste water treatment, *Water treatment, *Sewage treatment, *Gamma rays, Radioactivity effects, Irradiation, Water pollution control, Water quality control, Treatment.
Identifiers: USSR.

Investigations were conducted to elucidate the effect of the gamma dose rate and the fractionation of irradiation on the effectiveness of disinfection of water by gamma rays. Each experiment was done with at least 10 to 15 replications and t-tests were applied to the results. Results indicate that the effects of several irradiations undergo summation and are the same as the effect of one time irradiation with the same total dose, provided that the intervals are not unduly prolonged. (Smith-Texas)
W73-06787

MECHANISM OF THE BACTERICIDAL EFFECT OF UV RADIATION IN DISINFECTION OF DRINKING WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05F.
W73-06789

INDUSTRIAL-MUNICIPAL WASTE WATER TREATMENT PLANT UPDATED.

Public Works, Vol 103, No 9, p 78-79, September, 1972.

Descriptors: *Water treatment, *Waste water treatment, *Waste treatment, *Treatment facilities, *Municipal wastes, Pilot plants, Research and development, Sewage treatment, Industrial wastes, Biological treatment, Activated sludge, *New Jersey.

The American Cyanamid Organic Chemicals Division constructed a large scale plant to study the waste flow from their facilities. As a result, Cyanamid decided to construct its own waste treatment facility instead of using the local municipal waste water treatment plant. Some important reasons were: (1) the BOD loading would represent about 90% of total BOD loading in a combined system, (2) pilot plant studies showed need for a detention time in the treatment process

3 times as long as is normally required for sewage treatment, and (3) chemical manufacturing operations change rapidly and often radically. Details are presented on the activated sludge plant built by American Cyanamid. The plant was used not only to treat industrial wastes from American Cyanamid, but also to perform secondary treatment on municipal wastes. The local sewerage authority reimburses Cyanamid for costs of electric power, chlorine, and laboratory labor. (Smith-Texas)
W73-06796

EFFECT OF AGEING MICROBIAL POPULATIONS ON SUBSTRATE REMOVAL PATTERNS IN MIXED SUBSTRATE SYSTEMS,
Oklahoma State Univ., Stillwater.
J. A. Heidman.
Available from University Microfilms, 300 N. Zeeb Rd. Ann Arbor, Michigan, 48106. Order No 71-11,164. Ph. D. Dissertation, 160 p, 1970.

Descriptors: *Activated sludge, *Sludge treatment, *Sludge digestion, Sludge, *Microbial degradation, Laboratory tests, *Waste water treatment, Waste treatment, Inhibition, Inhibitors, Enzymes, Metabolism, Age.
Identifiers: *Cell age, Glucose, Galactose, Sorbitol, Enzyme inhibition.

An attempt was made to gain an insight into the significance of cell age in relation to the degree of expression of various metabolic control mechanisms. Two heterogeneous microbial systems were operated for an extended period of time. One was grown on sorbitol minimal medium and the other on galactose minimal medium. When glucose was added to either young or old cells, that were actively metabolizing sorbitol or galactose, the removal of that compound was impeded until the glucose had been removed. Under the ageing conditions employed, cell age was found to have no effect on the degree of enzyme inhibition encountered at any time. Increasing the cell age by extended batch operations did not reduce the extent of repression or inhibition observed with the young pure cultures. The dependence of the degree of inhibition of the preformed sorbitol enzymes on the particular organism studied provided an explanation of the wide variation in the degrees of inhibition encountered with heterogeneous populations. (Smith-Texas)
W73-06800

WASTEWATER MANAGEMENT BY DISPOSAL ON THE LAND.
Cold Regions Research and Engineering Lab., Hanover, N.H.

CRREL Special Report 171, May 1972. 190 p, 28 fig, 22 tab, 471 ref.

Descriptors: *Sewage treatment, *Sewage disposal, *Land management, *Spray irrigation, *Reviews, *Waste water treatment, *Water reuse, Sanitary engineering, Sewage, Infiltration, Surface waters, Water chemistry, Water pollution, Water quality, Water treatment, Waste disposal.

A comprehensive technical assessment is presented of the effects and effectiveness of the methods used for disposal of wastewaters on the land. Three basic application techniques are considered: Spray irrigation, overland runoff, and rapid infiltration, and the related ecosystem responses to each. It is concluded that the product water from such operations can and should approach drinking water-irrigation water standards in quality. Of the three modes, spray irrigation offers the highest degree of reliability and potential longevity. Further definition is required for system capacity for the other two modes, but overland runoff is given preference over rapid infiltration based on currently available information. The report not only provides an assessment of the current state of the art but documents the need for work leadint to optimum criteria for design, construction and operation of cost-effective and environmentally compatible systems. (OWRR)
W73-06862

REMOVAL OF HEAVY METALS FROM WATER AND BRINE USING SILICON ALLOYS,
Garrett Research and Development Co., Inc., La Berne, Verne, Calif.
J. P. McKaveney, W. P. Fassinger, and D. A. Stivers.
Environmental Science and Technology, Vol 6, No 13, p 1109-1113, December 1972. 5 tab, 22 ref.

Descriptors: *Waste water treatment, *Separation techniques, *Heavy metals, Water pollution, Chemistry, Aqueous solutions, Research and development, Chemical reactions, Economics, Chemical properties, Arsenic compounds, Cadmium, Copper, Chromium, Iron, Mercury, Lead, Zinc, Calcium, Magnesium, Laboratory tests, *Brine, *Silicates, *Alloys.

A one-step exchange treatment using silicon alloys is proposed for removing heavy metals from waste waters and brine solutions. Silicon alloys of calcium and magnesium produced the best results both from the view of scope in the exchange (zinc thru mercury in the electromotive series) as well as replacement of heavy metals with elements common to natural waters (calcium and magnesium). Silicon alloys of aluminum, barium, iron, and titanium were also found suitable but their use may require some posttreatment (Hydrolysis or sulfate precipitation). Ferrosilicon is fairly selective in removing mercury without significant iron contamination of the water. The alloys can be used in either a column or batch contact type of operation. Brine and other aqueous solutions over the pH range of 2-12 have been treated. However, to minimize acid attack and to conserve alloy, the pH should be less than 4.0. Metals successfully removed were: Ag, As, Au, Cd, Cu, Cr, Fe, Hg, Pb, V, and Zn. Mercury has also been successfully removed from chlor-alkali brines. (Jerome-Vanderbilt)
W73-06875

A MINERAL ECONOMICS APPROACH TO ENVIRONMENTAL CONTROL,
Pennsylvania State Univ., University Park. Dept. of Mineral Economics.
For primary bibliographic entry see Field 05G.
W73-06886

RECYCLING ZINC IN VISCOSE RAYON PLANTS BY TWO STAGE PRECIPITATION.
American Enka Corp., N.C.

Environmental Protection Agency, Technology Transfer Capsule Report, Industrial Demonstration Grant, 1972. 12 p, 6 fig, 2 tab. EPA 12090 ESG.

Descriptors: *Zinc, *Waste water treatment, *Heavy metals, *Recycling, Water pollution, Industrial wastes, Textiles, Settling, Economics, Research and development, *North Carolina.
Identifiers: *Technology transfer.

In this EPA demonstration grant with the American Enka Company, a two-stage process for precipitating a dense sludge of high zinc assay was proven. The zinc in the sludge was recovered and recycled to the rayon manufacturing plant. This recycling of zinc was shown to have no ill effects on the rayon yarn. There are 10 viscose rayon manufacturing plants in the United States, all of which are believed to use zinc sulfate in their spinning bath. This process greatly enhances the economics of removing this sources of zinc pollution, allowing neutralization of the acid stream and recovery of the zinc at a good profit for industrial yarns and at a moderate cost for textile yarns. (See also W72-02364) (Oleszkiewicz-Vanderbilt)
W73-06890

STUDY ON THE REMOVAL OF CADMIUM ION FROM MINE WATER BY AN UTILIZING OF XANTHATE AS SELECTIVE PRECIPITANT,
Iwate Univ., Morioka (Japan).
S. Hasebe, J. Shimoiizaka, I. Matsuoka, T. Kato, and K. Yamamoto.
Preprint from International Congress on Industrial Waste Water, Stockholm, Sweden, Paper Mi. Wed. I 2, (1970). 17 p, 5 fig, 2 tab, 7 ref.

Descriptors: *Heavy metals, *Cadmium, *Waste water treatment, *Flotation, Zinc, Mercury, Gold, Silver, Chemical reactions, Laboratory tests, Mine water, Mining, Settling velocity, Water pollution control, *Chemical precipitation.
Identifiers: *Xanthate.

The results of research on removing cadmium can be summarized as follows: The solubility product of cadmium xanthate decreased with increasing chain length of alkyl group of xanthate. Flotation test gave nearly the same results as those derived from calculations. The equivalent amount of xanthate which was necessary for obtaining the same removal percent of Cd (+2) ion increased as Cd (+2) ion concentration in original solution decreased. The removal per cent of Cd (+2) ion decreased when Zn (+2) and Fe (+2) ions were in the solution, especially when a small amount of xanthate was added. The formation of the precipitate of cadmium xanthate depended closely on the condition of agitation of the solution. It was possible to reduce the concentration of Cd (+2) ion to less than 0.1 mg/l in an artificial mine water containing 1 mg/l of Cd (+2), 100 mg/l of Zn (+2) and 500 mg/l of Fe (+2) ions. Fe (+3) ion contained in mine water had to be removed before xanthation by converting it to ferric hydroxide. Au (+), Ag (+), Hg (+) and Hg (+2) ions could be precipitated as the xanthate salts even when they were at very low concentrations. Attempts at recovery of these ions are now in progress in the laboratory. (Oleszkiewicz-Vanderbilt)
W73-06891

THE BENEFICIAL USE OF STORM WATER,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 05G.
W73-06893

DEVELOPMENT AND DEMONSTRATION OF NUTRIENT REMOVAL FROM ANIMAL WASTES,
Cornell Univ., Ithaca, N.Y.
R. C. Loehr, T. B. S. Prakasam, E. G. Srinath, and Y. D. Joo.
Copy available from GPO Sup Doc as EP1.23/2:73-095, $3.45; microfiche from NTIS as PB-217 887, $0.95. Environmental Protection Agency, Technology Series Report EPA-R2-73-095, January 1973. 340 p, 100 fig, 41 tab, 194 ref. EPA/ORM Projects No. 13040 DPA and 13040 DDG 04/72.

Descriptors: *Nitrogen, *Phosphorus, Nitrification, Denitrification, Ammonia, Chemical precipitation, Forecasting, *Farm wastes, Nutrients, Pilot plants, Aeration, Phosphates, *Waste water treatment.
Identifiers: *Nutrient control, *Animal waste treatment processes, Ammonia stripping, Animal wastes.

Laboratory and pilot plant studies evaluated the feasibility of (a) chemical precipitation, (b) ammonia removal by aeration, and (c) nitrification and denitrification as methods to remove nitrogen, phosphorus, and color from animal waste waters.

Poultry and dairy manure solutions were used over a broad concentration range to illustrate the fundamentals of the processes as applied to these waters and to demonstrate the applicability of the processes. Alum, lime, and ferric chloride can be used for phosphorus control in animal waste water although the chemical costs are from 2-10 times those quoted for municipal waste water. Two predictive relationships were determined that appear useful for design and operation of phosphate removal systems. Ammonia removal was found to be feasible and detailed equations were developed and verified to determine the ammonia loss under specific environmental conditions. Nitrification followed by denitrification was found to be technically feasible. Parameters affecting the design and performance of these processes with animal waste waters were identified. (EPA)
W73-06894

UPPER TRINITY RIVER BASIN COMPREHENSIVE SEWERAGE PLAN.
Camp, Dresser and McKee, Boston, Mass.

Report prepared for the North Central Texas Council of Governments, Arlington, Texas, July 1970. 2 vols, 577 p, 36 fig, 73 tab, 9 append, 292 ref.

Descriptors: *Sewerage, *Comprehensive planning, *Sewage treatment, *Waste water disposal, Population, Water demand, Water quality, Facilities, Cost analysis, Pollution abatement, Storm runoff, Water reuse, Recycling, *Texas.
Identifiers: *Dallas, *Fort Worth.

The objective is to prepare a plan which will recommend an area-wide comprehensive sewerage system and program for interceptor and trunk sewers and sewage treatment and disposal facilities in the North Central Texas region and to suggest methods for plan implementation. The study examines the following topics: a geographical analysis of the study area; population; water consumption and sewage flow; water quality in the upper Trinity River; a description of proposed joint facilities in the metropolitan area of Dallas and Fort Worth; estimated construction, operation and maintenance costs; overall pollution control; infiltration and storm flows into the sewerage system; waste water reuse; and implementation of the comprehensive sewerage plan. (Davis-Chicago)
W73-06896

WATER AND SEWER PLAN AND PROGRAM, SANTEE-WATEREE REGIONAL PLANNING COUNCIL.
For primary bibliographic entry see Field 06B.
W73-06897

WATER SUPPLY AND SEWERAGE FOR THE WINDHAM REGION, PART I: BACKGROUND DISCUSSION.
Windham Regional Planning Agency, Willimantic, Conn.
For primary bibliographic entry see Field 06B.
W73-06902

WATER SUPPLY AND SEWERAGE FOR THE WINDHAM REGION, PART 2: REGIONAL PLAN.
Windham Regional Planning Agency, Willimantic, Conn.
For primary bibliographic entry see Field 06B.
W73-06903

REPORT ON LAKE TAHOE REGION WASTE WATER COLLECTION, TREATMENT AND DISPOSAL.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
May 1971. 36 p, 1 map, 9 append.

Descriptors: *Waste water treatment, *Waste water disposal, *Sewerage, *Water quality control, Water transfer, Water reuse, Recycling, Water policy, Industrial wastes, Future planning (Projected), *California, *Nevada.
Identifiers: *Lake Tahoe, *Waste water export, Policy.

The basic goals of the waste water program for the Lake Tahoe Basin are: (1) the preservation of water quality in Lake Tahoe by the removal of waste water from the Basin through connections of all waste-producing facilities to an adequate collection, treatment and export system; and (2) encourage and support the development of treatment methods which will produce water suitable for beneficial reuse in the Basin. A history of the Lake Tahoe Region waste water collection, treatment, and disposal is presented. The present status of sewage export; policy regarding the disposal of sewage and industrial waste waters within the Lake Tahoe Basin; future service areas; future projects, and an outline of regional waste water treatment plants and export systems are included. (Davis-Chicago)
W73-06904

SUMMARY WATER AND SEWERAGE STUDY FOR THE OLD COLONY REGIONAL PLANNING DISTRICT.
Old Colony Regional Planning District, Abington, Mass.
For primary bibliographic entry see Field 06B.
W73-06908

REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE.
Cahn, Inc., New Haven, Conn.

Report prepared for the Northeastern Connecticut Regional Planning Agency, Brooklyn, Connecticut, June 1972. 40 p, 6 fig, 11 tab, 74 ref, 7 append. HUD-CONN-P-1003.

Descriptors: *Sewerage, *Water supply, *Storm runoff, Short-term planning, Long-term planning, Drainage systems, Facilities, Cost analysis, Administration, Financing, *Connecticut.
Identifiers: *Storm drainage, Urban development.

Short and long term recommendations are presented for sewerage, water supply and storm drainage for the Northeastern Connecticut Region. The recommendations are based on a consideration of physical problems resulting from location and topography, existing development and future land use, major existing sewerage, water supply and storm drainage facilities, and the relative economies of municipal and inter-municipal alternatives. Existing, short range and long range service areas for the sewerage and water supply systems were determined. Existing major facilities such as interceptors, pump stations, and treatment plants for sewerage and transmission lines, sources of supply and storage tanks for water supply were identified, preliminary location and arrangement of future major facilities to serve the short and long range service areas were determined, preliminary cost estimates for short range recommendations were presented. Advantages and disadvantages of the various administrative organizations that could be used to construct, operate and finance the proposed utility systems. (Davis-Chicago)
W73-06911

WATER AND SEWERAGE PLAN AND PROGRAM-- 1971-72.
Metropolitan Washington Council of Governments, Washington, D.C.
For primary bibliographic entry see Field 06B.
W73-06912

PHASE II: REGIONAL WATER, SEWERAGE, AND DRAINAGE PROGRAM, INITIAL PLAN.
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 03D.
W73-06918

MANAGING THE NATURAL ENVIRONMENT, A REGIONAL PLAN FOR WATER, SEWAGE, AIR, AND REFUSE,
Tri-State Transportation Commission, New York.
For primary bibliographic entry see Field 03D.
W73-06920

RESEARCH ACTIVITIES BY WATER UTILITIES.
For primary bibliographic entry see Field 05F.
W73-06931

WATER PURIFICATION SYSTEM,
For primary bibliographic entry see Field 05F.
W73-07002

TWO-STAGE AEROBIC AND FACULTATIVE WASTE TREATMENT,
Rex Chainbelt Inc., Milwaukee, Wis. (assignee).
R. A. Kormanik.
U.S. Patent No. 3,701,727, 3 p, 2 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 903, No 5, p 1652, October 31, 1972.

Descriptors: *Patents, *Biodegradation, *Waste water treatment, *Aerobic treatment, Aeration, Lagoons, Solids, Anaerobic conditions, Sewage treatment, Abatement, Pollution abatement, Water pollution control, Water pollution treatment, Water quality control, Treatment, Equipment, *Oxidation lagoons, *Sewage lagoons.

For a given flow of a waste having certain soluble BOD levels and volatile suspended solid content within limits there is a unique combination of high-rate aeration for a certain period followed by facultative treatment which together require less artificial aeration and less land area than required by conventional facultative lagooning. The apparatus and process does not require or involve any return of the flow from any one to another location in the system. A biodegradable waste is treated aerobically by high-rate aeration and mixing in a first basin for a critical period followed by low-rate aeration and mixing in the upper zone of a second basin and from which the effluent is withdrawn. The solids which settle to the lower zone decompose under anaerobic conditions and the liquid decomposition products are treated aerobically as they move upwardly from the lower into the upper zone. The second basin operates as a modified facultative lagoon. (Sinha-OEIS)
W73-07003

PROCESS FOR THE REMOVAL AND RECOVERY OF MINERAL POLLUTANTS FROM WATER,
Aerojet-General Corp., El Monte, Calif. (assignee).
For primary bibliographic entry see Field 03A.
W73-07008

SEPARATION OF ORGANIC SOLIDS FROM WASTE LIQUIDS,
Microphor, Inc., Willits, Calif. (assignee).
R. E. Burton.
U.S. Patent No. 3,700,590, 9 p, 11 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1374, October 24, 1972.

Descriptors: *Patents, Solid wastes, *Waste water treatment, Organic wastes, Microbial degradation, *Biological treatment, *Biodegradation, *Oxygenation, Abatement, Pollution abatement, Liquid wastes, Water pollution control, Water quality control, Equipment, Treatment,

*Biochemical oxygen demand, Separation techniques.

Masses or bundles of elongate individualized bark fibers, particularly redwood bark fibers are placed within one or more chambers through which both oxygen-containing gas and waste liquids must pass. The microbiological communities which are present in the fibers thrive upon and consume the organic solid wastes thus reducing the BOD. (Sinha-OEIS)
W73-07010

METHOD FOR THE REMOVAL OF COLLOIDAL SUSPENSIONS AND OTHER POLLUTANTS FROM LIQUID WASTES,
C. Calmon, A. H. Heit, and T. Helfgott.
U.S. Patent No. 3,699,039, 3 p, 8 ref; Official Gazette of the United States Patent Office, Vol 903, No 3, p 997, October 17, 1972.

Descriptors: *Patents, *Detergents, Anionic surfactants, *Liquid wastes, Surfactants, *Waste water treatment, *Filtration, Ion exchange, *Laundering, Domestic wastes, Industrial wastes, Separation techniques.
Identifiers: Colloidal suspensions, Abietic acid amines.

A scheme for purifying laundry wastes has the following steps: (a) contacting the waste with an excess of the stoichiometric amount of an acid salt of an abietic acid amine to form a colloidal amine surfactant complex within said laundry waste; (b) preferably allowing the mixture to age; and (c) filtering the mixture containing the complex, unreacted amine and other laundry contaminants through a compressible absorption filter medium having absorbent and/or ion exchange properties. The filtration is affected by relatively short surging cycles of constant pressure-falling rate filtration. (Sinha-OEIS)
W73-07013

ANTI-POLLUTION DEVICE FOR REMOVING DEBRIS FROM LIQUID,
R. E. Weber, and C. J. Zimmermann.
U. S. Patent No. 3,698,558, 5 p, 5 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 903, No 3, p 885, October 17, 1972.

Descriptors: *Patents, *Solid wastes, *Liquid wastes, *Filtration, Abatement, Pollution abatement, Equipment, Treatment, Diatomaceous earth, *Filters, Water treatment, *Waste water treatment, Debris.

A tank has an upper area where floating particles will rise and flow off into a specially provided receptacle. Heavy particles flow into a lower area in the tank. The flow of the liquid is slowed down by passing through helicoid ribs so that the heavy particles will have time to fall into the lower area. The liquid itself flows into a chamber within the tank and passes through two filters. The liquid may be passed through diatomaceous earth into filter screen tubes and then pass into an upper chamber before making its exit. (Sinha-OEIS)
W73-07014

METHOD AND APPARATUS FOR TREATMENT OF AQUEOUS LIQUOR,
D. S. Blaisdell, and R. E. B. Klaas.
U. S. Patent No. 3,697,420, 16 p, 18 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 903, No 2, p 611, October 10, 1972.

Descriptors: *Patents, *Sewage treatment, Biochemical oxygen demand, Flocculation, Municipal wastes, Industrial wastes, Chemical reactions, Coagulation, Separation techniques, *Oxidation, Filtration, Treatment, Equipment, Abatement, Pollution abatement, Water pollution control, Water quality control, *Polyelectrolytes, *Waste water treatment.
Identifiers: Agglomeration, Chemical treatment, *Magnetic densification.

In addition to citing 30 examples illustrating experiences with this invention, basic understandings of underlying theory are set forth. The sewage treatment methods and apparatus disclosed relate to catalytic oxidation, digestion under the influence of magnetic fields, the use of weighting agents and magnetic densification. Magnetic densification is achieved by adding cationic polyelectrolytic coagulants and magnetic weighting agents to sewage and densifying the coagulated solids under the influence of a magnetic field which may be either uniform or nonuniform, producing a clarified effluent. (Sinha-OEIS)
W73-07015

SEWERAGE DISPOSAL PROCESS AND APPARATUS,
E. J. McCrink.
U. S. Patent No. 3,695,432, 3 p, 1 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 903, No 1, p 150, October 3, 1972.

Descriptors: *Patents, Solid wastes, Liquid waste, *Sewage treatment, Sewage, *Domestic wastes, Equipment, Treatment, Waste treatment, Water quality control, Water pollution control, Abatement, Pollution abatement, Separation techniques, *Waste water treatment, *Settlings basins, *Drying, *Incineration.

Sewerage is pumped into a settling tank where solid material is allowed to sink to the bottom while the liquid overflows. The solid materials are pumped along with the an inert atmosphere into a conduit comprising an electric resistance heating element which heats the material to a very high temperature. The solid is dried and dissociated. Gases which are driven off pass through a flame curtain whereby odors and noxious products are burned. The solids remaining form a small amount of unobjectionable powdered ash. (Sinha-OEIS)
W73-07017

FOAM FRACTIONATION AND PRECIPITATE FLOTATION OF ZINC (II),
Ohio State Univ., Columbus. Dept. of Civil Engineering.
A. J. Rubin, and W. L. Lapp.
Separation Science, Vol 6, No 3, p 357-363, 1971. 5 fig, 7 ref. OWRR A-013-OHIO (1).

Descriptors: *Foam separation, *Waste water treatment, *Foam fractionation, Foaming, *Zinc, Hydrolysis, Separation techniques, Hydrogen ion concentration, Ions, Water treatment.
Identifiers: Sodium lauryl sulfate, Metal ions, Precipitate flotation.

The hydrolytic behavior of a metal can be related to its removal by foaming. The effects of pH and ionic strength on the foam separation of 0.1 mM zinc (II) were investigated using different concentrations of sodium lauryl sulfate as the collector. At low pH $Zn2+$ ion was removed by a foam fractionation while above pH 8 Zn $(OH)2$ (s) was removed by precipitate flotation. The results demonstrate that precipitate flotation is a more efficient removal process than the foam separation of soluble metal species.
W73-07030

TERTIARY TREATMENT BY LIME ADDITION AT SANTEE, CALIFORNIA,
Santee County Water District, Calif.
H. Almgren.
Available from the National Technical Information Service as PB-217 888, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency, Report EPA-R2-73-206, March 1973. 189 p, 25 fig, 36 tab, 23 ref. EPA Project 17080 EDV. WPRD 5-01-67.

Descriptors: *Tertiary treatment, *Solids contact processes, *Chemical precipitations, *Filtration, *Phosphorus compounds, Algal control, Reclaimed water, Sewage treatment, Sanitary engineering, Sludge disposal, Eutrophication, California, Lime, Activated sludge, *Waste water treatment.
Identifiers: *Algae assay procedure, *Santee (Calif.), Recarbonation.

A two mgd tertiary treatment plant for chemical and physical treatment of activated sludge effluent has been built and tested at Santee, California. The plant demonstrated the removal of phosphorus by lime addition and tertiary filtration in a full scale treatment plant operated under typical field conditions. The plant has a design capacity of two mgd. Total phosphorus removals in the reactor-clarifier were 85 percent with a 60 mg/l lime dosage (pH 9.5-10.0) and 95 percent with 200 mg/l (pH 10.5-11.0). Filtration performance was not satisfactory. The cost of tertiary treatment at 1.5 mgd and 200 mg/l lime dosage, under steady flow and negligible sludge disposal costs is 16.03 cents per thousand gallons. Laboratory and field studies were conducted to evaluate the effect of three tertiary waste treatment processes on the amount of algal growth in the effluent after treatment. The studies included determination of the absolute levels of algal growth under controlled conditions, (Algal Assay Procedure and continuous culture) and comparison with field observations in special study ponds. In addition, determinations of the growth limiting nutrients in each effluent were made. Lime treatment (pH 10.5-11.0) reduced the algal growth potential ten fold. (EPA)
W73-07062

PRELIMINARY STUDIES ON A BIOLOGICAL FILTER.
Limnetics, Inc., Milwaukee, Wis.
For primary bibliographic entry see Field 05G.
W73-07063

ABATEMENT OF POLLUTION FROM A POULTRY PROCESSING PLANT,
Maine Univ., Orono. Dept. of Civil Engineering.
F. E. Woodard, O. J. Sproul, M. W. Hall, and M. M. Ghosh.
Journal Water Pollution Control Federation, Vol 44, No 10, p 1909-1915, October 1972. 2 fig, 6 tab, 2 ref.

Descriptors: *Waste treatment, *Food processing industry, *Poultry, *Equipment, *Biochemical oxygen demand, *Water pollution abatement, *Treatment facilities, Flocculation, Chlorination, Sludge treatment, Water quality control.
Identifiers: *Air flotation, Clarification, Clarifiers, Grease.

A reduction of the average daily BOD discharge (1,295 kg/day to less than 227 kg/day) from a poultry processing plant has been accomplished by a prototype dissolved air flotation plant. The design features involve passing the wastewater flow through a feather screen into a wet well, where soda ash and slum are added on the inlet side and a polyelectrolyte fed into the discharge pipe downstream from the pumps. Flocculation occurs in the center tank of the flotation unit receiving the flow where air-saturated, recycled, clarified wastewater is mixed with the flocculated waste thereby forming a float which can be withdrawn and retained in sludge tanks. Clarified water is chlorinated and either discharged directly or first barometrically condensed in the rendering plant. In addition to BOD, the suspended solids and grease have been reduced significantly by the process. (Mackan-Battelle)
W73-07094

COMBINED CARBON OXIDATION-NITRIFICATION,
Consoer, Townsend and Associates, Chicago, Ill.

W. J. Beckman, R. J. Avandt, T. J. Mulligan, and G. J. Kehrberger.
Journal Water Pollution Control Federation, Vol 44, No 10, p 1916-1931, October 1972. 17 fig, 5 tab, 9 ref.

Descriptors: *Waste water treatment, *Nitrification, *Oxidation, *Activated sludge, *Biological treatment, *Heavy metals, Water quality control, Microbial degradation, Separation techniques, Sewage bacteria, Copper, Chromium, Zinc, Nickel, Waste treatment, Treatment facilities, Phosphorus, Chemical reactions, Sludge treatment, Aeration, Biochemical oxygen demand, Suspended solids, Ammonia, Nitrogen compounds, Dissolved oxygen.
Identifiers: *Chemical interference, Nitrosomonas, Nitrobacter, Clarification, Organic nitrogen, Ammonia nitrogen.

In the study of a combined carbon oxidation-nitrification activated sludge facility it was found that sludge doses of heavy metals could affect the rate of nitrification, thereby affecting the effectiveness of the treatment process. Doses of Cu and Cr at 1.0 mg/l or less did not retard the reaction, but slugs of Zn and Ni at concentrations greater than 0.5 mg/l did inhibit the rate of nitrification. Complete inhibition was not observed, however, even with concentrations as high as 3.0/mg/l. (Mackan-Battelle)
W73-07095

INDUSTRIAL WASTES. MEAT-, FISH-, AND POULTRY-PROCESSING WASTES,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 05B.
W73-07106

NITROGEN REMOVAL: A LITERATURE SURVEY,
Kansas State Board of Health, Topeka. Div. of Environmental Health.
T. G. Reeves.
Journal Water Pollution Control Federation, Vol 44, No 10, p 1895-1908, October 1972. 99 ref.

Descriptors: *Nitrogen, *Nitrogen compouns, *Water pollution treatment, *Water pollution sources, *Reviews, *Waste water treatment, *Nutrient removal, Fertilizers, Methodology, Microbial degradation, Chemical precipitation, Biological treatment, Nitrification, Denitrification, Filtration, Distillation, Ion exchange, Chlorination, Reverse osmosis, Nitrogen fixing bacteria, Activated carbon, Activated sludge, Electrochemistry, Pseudomonas, Waste water (Pollution).
Identifiers: Chemical treatment, Air stripping, Nitrosomonas, Nitrosococcus, Nitrosospura, Nitrosocystis, Nitrosogloes, Achromobacter, Bacillus, Micrococcus.

A literature review is presented on sources of and techniques for the removal of nitrogen and nitrogen compounds from wastewater. While sources may vary as widely as domestic wastes to fertilizer, treatment is limited by practicality and expense. Large scale air stripping cannot yet be considered practical due to cost and physico-chemical problems. Ion exchange may be feasible but only on a small scale. The most practical available method is biological nitrification-denitrification involving a 3-stage system which includes a BOD removal unit, a nitrification (aerobic) unit, and a denitrification (anaerobic) unit. Other processes, such as electrochemical precipitation, electrodialysis, reverse osmosis, distillation, breakpoint chlorination, filtering, and sludge techniques are discussed. (Mackan-Battelle)
W73-07109

ROLE OF BIOLOGICAL PURIFICATION PONDS IN ENRICHING THE OXYGEN CONTENT OF WATER. (IN RUSSIAN).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzhaniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenia i Inzhenernoi Gidrogeologii, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-07116

A COMPARATIVE EVALUATION OF THE TOXIC EFFECT OF INDUSTRIAL DISCHARGE OF THE SYNTHETIC RUBBER PLANT IN TOL-'YATTI ON INTESTINAL MICROFLORA, (IN RUSSIAN),
For primary bibliographic entry see Field 05C.
W73-07144

5E. Ultimate Disposal of Wastes

THE EFFECTS OF WASTE DISPOSAL IN THE NEW YORK BIGHT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 05C.
W73-06540

BIOLOGICAL SURVEY OF SUBMERGED REFUSE,
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 05B.
W73-06594

WE DON'T WASTE WASTES,
Saint Petersburg Street Dept., Fla.
For primary bibliographic entry see Field 05D.
W73-06603

MAGNETIC RECLAMATION: A GROWING TREND IN SOLID WASTE MANAGEMENT.
For primary bibliographic entry see Field 05D.
W73-06740

ENGINEERING ASPECTS OF THE DISPOSAL OF UNUSED PESTICIDES, PESTICIDE WASTES, AND PESTICIDE CONTAINERS,
Mississippi Agricultural and Forestry Experiment Station, State College.
For primary bibliographic entry see Field 05D.
W73-06752

CONVERSION OF SOLID WASTE TO LIQUID FUEL,
Worcester Polytechnic Inst., Mass. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W73-06753

BIOLOGICAL TREATMENT OF POULTRY MANURE REDUCES POLLUTION,
For primary bibliographic entry see Field 05D.
W73-06755

HYDROGEOLOGY OF SOLID WASTE DISPOSAL SITES IN MADISON, WISCONSIN,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05B.
W73-06762

HAWAII'S ENVIRONMENTAL PLANNING AIMS AT FLEXIBILITY IN SOLID WASTE MANAGEMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W73-06764

STUDIES OF SANITARY STATUS OF SHORE WATERS OF THE SEA OF AZOV AT TAGANROG,
Nauchno-Issledovatelskii Institut Epidemiologii, Mikrobiologii i Gigieny, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 05B.
W73-06792

WASTEWATER MANAGEMENT BY DISPOSAL ON THE LAND.
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 05D.
W73-06862

REPORT ON LAKE TAHOE REGION WASTE WATER COLLECTION, TREATMENT AND DISPOSAL.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 05D.
W73-06904

5F. Water Treatment and Quality Alteration

REPORT ON WASTES FROM MISSOURI AND MISSISSIPPI RIVER WATER TREATMENT PLANTS SOURCES QUANTITIES CHARACTERISTICS INPACT ON WATER QUALITY.
Black and Vetach, Kansas City, Mo.

Report for Missouri River Public Water Supplies Association, University City, Missouri, December 5, 1972. 70 p, 4 fig, 13 tab, 12 ref. 6044

Descriptors: *Sludge disposal, *Water purification, *Water treatment, *Water softening, *Sludge, Chlorination, Coagulation, Disinfection, Filtration, Pumping, Settling basins, Missouri River, Mississippi River, Nebraska, Iowa, Kansas, Missouri.
Identifiers: *Sludge production, Alum sludge, Ferric sludge, Lime sludge, Rapid sand beds.

Data are presented on the sources, quantities, and characteristics of wastes emanating from 16 water treatment plants located at Omaha, Neb.; Council Bluffs, Iowa; St. Joseph, Atchison, Leavenworth, Kansas; Kansas City, Lexington, Boonville, Jefferson City, and St. Louis City and County, Missouri. All plants embody multi-stage mixing, sedimentation basins, and rapid-sand filters plus coagulation with alum or iron salts, disinfection with chlorine, and in the majority of plants, lime softening. Raw water pumpage is less than 1 percent of river flow. River sediment removed from and then returned to the river is an extremely small part of the total sediment load carried by the river. Basin cleaning results in 'slug' discharges which produce minimal adverse effects on quality. Chemical solids from the 12 softening plants are composed principally of calcium carbonate, minor amounts of the hydroxides of magnesium, iron and aluminum, trace amounts of manganese derived from lime, river sediment, or potassium permanganate applied for odor reduction. Prechlorination has a negligible effect on the production of chloride returned to the river. The pH of treatment plant wastewater is in the 6.5-10.5 range and produces no detectable effect after discharge into the river. The overall effects of chemical solids on river water quality are virtually nil. Downstream water treatment plants would not be benefited by the elimination of discharges from upstream water treatment plants because such discharge are undectectable. (Taras-AWWA)
W73-06595

CHARACTERIZATION OF ORGANIC COMPONENTS IN A MUNICIPAL WATER SUPPLY,
Environmental Protection Agency, Evansville, Ind.
For primary bibliographic entry see Field 05A.

W73-06629

ION-EXCHANGE SYSTEM TO TREAT HIGH-NITRATE WELL WATER,
Bowne (Sidney B.) and Son. Mineola, N.Y.
J. C. Gregg.
Public Works, Vol 103, No 9, p 81, September, 1972. 1 fig.

Descriptors: *Water treatment, *Wells, *Subsurface waters, *Ion exchange, Groundwater, *Nitrates, Water pollution control, Water quality control, Water pollution treatment, Resin, *New York, Treatment facilities.
Identifiers: Garden City (N. Y.), Well water pollution, Long Island.

An ion exchange process originally developed to demineralize industrial process water will be adapted to remove harmful nitrates from well water in the Garden City Park Water District, in Nassau County, Long Island, New York. Water from some of the districts wells contained nitrates up to 22 mg/l. Four of the nine wells serving the district were forced to shut down and two others are approaching the nitrate limit of 10 mg/l. The ion exchange system is now being constructed to treat water and maintain a continuous flow of 1,200 gallons per minute and 80 psi. The nitrate removal loop will be bypassed for 30 seconds every 10 minutes, while spent ion exchange resin is being pulsed to the regenerating section of the loop. (Smith--Texas)
W73-06741

BASIC GAS CHLORINATION MANUAL; IV.
Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 05A.
W73-06746

VIRUS REMOVAL BY CHEMICAL COAGULATION,
Illinois Univ., Urbana.
M. Chaudhuri.
Available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Michigan, 48106, Order No. 70-13, 275, Price: $6.00, Microfilm $4.00. Ph. D. Dissertation, 107 p, 1969.

Descriptors: *Viruses, *Coagulation, *Coagulants, *Waste water treatment, *Water treatment, Polyelectrolytes, Water pollution control, Water pollution, Water quality control, Water quality, Laboratory tests, Hydrogen ion concentration.
Identifiers: *Aluminum sulfate.

Chemical coagulation was studied in the laboratory as a method for the removal of viruses. It was shown that removal of viruses from water by chemical coagulation with aluminum sulfate consists of a primary reaction step that involves an interaction between aluminum and the virus coat protein. Neither the kinetics or the stoichiometry of the reaction was affected by the period of storage of the virus particles, the quantity of available aluminum or the presence of bivalent cations like calcium and magnesium. The optimum coagulant dosages and pH values were 40 to 50 mg/l of aluminum sulfate at pH 5.24 for bacteriophage T4 and at pH 6.0 for bacteriophage MS2. The highest removals attained were 98 and 99.9% respectively. The removal efficiency was lowered significantly by the presence of organic matter like albumins, wastewater and wastewater effluent. Commercially available cationic polyelectrolytes were found effective both as coagulant aids and as prime coagulants. (Smith-Texas)
W73-06763

DISINFECTION OF DRINKING WATER WITH DOSING CARTRIDGES IN ROVNO,
Regional Sanitary-Epidemiological Center, Rovno (USSR).
K. G. Sergeev, M. L. Klimenko, G. I. Porgrebnyak, and V. E. Zezyulin.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos. 1-3, p 120-121, January-March, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Chlorination, *Water treatment, *Water quality control, *Water quality, Lime, Groundwater, Potable water, Water supply, Treatment facilities, Disinfection.
Identifiers: *Bacterial contamination, *Rovno, USSR.

The City of Rovno draws its water supply from an aquifer contained in a highly fractured layer of rock, with fractures extending to the surface. There is bacterial contamination of the subsurface water by surface waters penetrating into the aquifer and therefore the water supplies for domestic drinking purposes must be continuously disinfected. The City now uses pipes suspended below the water surface filled with dry chlorinated lime and always containing at least 20% active chlorine; the mouths of the pipes are sealed by a cement solution or a polyethylene film. (Smith-Texas)
W73-06768

STUDIES OF THE EFFECT OF DESALINATED DRINKING WATER ON THE FUNCTIONAL STATE OF THE ORGANISM,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-06769

ON THE USE OF ALLUVIAL GROUNDWATERS FROM THE IRTYSH FLOODPLAIN IN GROUP WATERWORKS IN THE PAVLODAR REGION,
V. V. Popov, A. S. Svishchev, L. K. Polezhaev, E. N. Lushin, and N. R. Shaimerdenov.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation Vol 36, Nos 1-3, p 186-191, January-March, 1971. 1 fig, 3 tab, 9 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Groundwater, *Treatment facilities, *Water supply, Potable water, *Design criteria, Alluvium, Hydrogeology, Project benefits, Project life, Aquifers.
Identifiers: *Pavlodar region, USSR.

Data are presented on designing a group of water supply systems in the Pavlodar district with water intake from the Irtysh river. Subsequently expensive water treatment installations will be built while it is still possible to make use of the water bearing stratum of the alluvium of the floodlands. As an example, the geological and hydrogeological conditions prevailing in the Irtysh floodlands in the region of Ermak are described. The existing reserve of groundwater available for the town water supply was assessed. (Smith-Texas)
W73-06770

SANITARY EVALUATION OF WATER DESALINATED BY THE EDUM-300-2 ELECTRODIALYZER,
Meditsinskii Institut, Tselinograd (USSR).
N. I. Anan'ev, and N. A. Demin.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 269-271, January-March, 1971. 1 tab, 2 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Desalination, *Desalination apparatus, *Hardness, Potable water, Water supply, Water quality, Water quality control, Electrodialysis, *Water treatment.
Identifiers: *USSR.

A test of the Edum-300-2 desalting electrodialyzer with an output of 300 to 2,000 liters per hour demonstrated its efficiency in the desalination of water. The unit was tested under two working regimes: (1) 200 volts with 5 amps and (2) 250 volts with 7 amps. Samples were taken every 3 hours during the operation. The second regime produced a greater reduction in mineral content and satisfied the requirements set out in the state standards of the U.S.S.R. Although further tests will be performed, it is already possible to state that the Edum-300-2 electrodialyzer can be successfully used in settlements on virgin lands suffering from lack of good freshwater. (Smith-Texas)
W73-06771

CONCERNING THE WATER SUPPLY FOR CHEREPOVETS,
Regional Sanitary-Epidemiological Center, Vologda (USSR).
N. A. Kulanova, and A. I. Lobacheva.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, No 1-3, p 272-273, January-March, 1971. Trans from Gigiena i Sanitariya.

Descriptors: *Water supply, *Potable water, Industry, Water quality standards, Public health, Metallurgy, Chemical industry, Chlorination, *Water treatment.
Identifiers: *Cherepovets, USSR.

Since the early 1920's there has been a marked improvement in the water supply at Cherepovets. However, in relation to the further development of metallurgical and especially chemical industries, the public health authorities have suggested to the management of the Cherepovets metallurgical works that steps be taken to expand and reconstruct the waterworks installations with a view to doubling their capacity in order to satisfy growing requirements for drinking water. (Smith-Texas)
W73-06772

EXPERIMENTAL DATA FOR THE VALIDATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF COBALT IN WATER BODIES,
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 05C.
W73-06773

REDOX POTENTIAL MEASUREMENTS FOR DETERMINING THE DISINFECTING POWER OF CHLORINATED WATER,
National Inst. of Public Health, Stockholm (Sweden). Dept. of Environmental Health.
K. Victorin, K. G. Hellstrom, and R. Rylander.
J Hyg. Vol 70, No 2, p 313-323. 1972. Illus.
Identifiers: *Water analysis, *Oxidation-reduction potential, *Disinfection, Chloramine, *Chlorine, Chlorite, Cyanuric acid, Halazone, Measurement, Sodium, E. coli.

The kill of Escherichia coli within 3 min was studied in chlorine-demand-free water using sodium hypochlorite, monochloramine, dichloramine, halazone, chloramine T, cyanuric acid plus sodium hypochlorite and cyanuric acid plus monochloramine. The redox potential and the available chlorine were measured. The redox potential was better correlated with the disinfecting property of the water than was the amount of available chlorine. For individual pure chlorine compounds, the measuring of available chlorine showed in general a somewhat better correlation with reduction of the bacteria than the redox potential showed.--Copyright 1972, Biological Abstracts, Inc.

W73-06777

SURVIVAL OF ENTEROVIRUSES AND ADENOVIRUSES IN WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05B.
W73-06778

ON A NEW BIOLOGIC AGENT FOR NATURAL SELF-PURIFICATION OF WATER BODIES,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05D.
W73-06781

DETERMINATION OF TRACE AMOUNTS OF FLUORINE IN URINE AND WATER,
Ministerstvo Zdravookhraneniya SSSR, Moscow. Institut Biofiziki.
For primary bibliographic entry see Field 05A.
W73-06785

EFFECT OF DOSE RATE ON DISINFECTION OF WATER BY GAMMA RAYS,
Academy of Municipal Economy, Moscow (USSR).
For primary bibliographic entry see Field 05D.
W73-06787

MECHANISM OF THE BACTERICIDAL EFFECT OF UV RADIATION IN DISINFECTION OF DRINKING WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
I. I. Kornev.
Available from the National Technical Information Service as part of TT 71-50122/4-6, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos 4-6, p 349-353, April-June 1971. 2 fig, 2 tab, 8 ref. Trans from Gigiena i Sanitariya.

Descriptors: *Ultraviolet radiation, *Irradiation, *Waste water treatment, *Water treatment, *Pathogenic bacteria, Fermentation, E. coli, *Disinfection, Treatment facilities, Radioactivity effects, Water quality control, Water pollution control, Potable water.

Radiation is a very effective and promising method for the disinfection of water at waterworks, on account of the development of new and powerful sources of radiation. A study of the action of UV radiation on bacterial cells detected an inhibition of dehydrogenase and decarboxylase activity in cells of the first population and a gradual restoration of the firmentative activity in cells of the second, third and fourth populations. Profound disturbances of the DNA structure and morphological changes were detected in irradiated E. coli. The finding was that the virulence of the Sal typhi for albino mice was slightly lower in the cells of the first population of irradiated bacteria, but was completely restored in the cells of the second, third and fourth population. (Smith-Texas)
W73-06789

ON POLLUTION OF SUBSURFACE WATERS,
For primary bibliographic entry see Field 05B.
W73-06793

SANITARY BACTERIOLOGICAL AND HYDROBIOLOGICAL EVALUATION OF WATER SOURCES IN WEST SIBERIA,
Graduate Medical Inst., Novokuznetsk (USSR).
For primary bibliographic entry see Field 05B.
W73-06794

PRELIMINARY WATER PLAN FOR THE BALTIMORE SECTION,
Regional Planning Council, Baltimore, Md.
For primary bibliographic entry see Field 03D.
W73-06895

WATER SUPPLY AND SOLID WASTE FACILITIES, ALLEN COUNTY, OHIO.
Jones and Henry Engineers, Ltd., Toledo, Ohio.
For primary bibliographic entry see Field 06B.
W73-06898

LIMNOLOGY AND WATER QUALITY OF THE LAKE TAHOE REGION, A GUIDE FOR PLANNING.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 05G.
W73-06905

RESEARCH ACTIVITIES BY WATER UTILITIES.

Journal of the American Water Works Association, Vol 64, No 10, Pt 1, p 634-651, October 1972. 2 fig.

Descriptors: *Water treatment, *Heavy metals, *Activated sludge, *Waste water treatment, Calcium, Cadmium, Cobalt, Chromium, Copper, Iron, Mercury, Potassium, Magnesium, Manganese, Molybdenum, Sodium, Nickel, Lead, Zinc, Metals, Turbidity, Suspended solids, Biochemical oxygen demand, Chemical oxygen demand, Phosphorus, Ammonia, Nitrates, Nitrogen, Conductivity, Hydrogen ion concentration, Alkalinity, Coliforms, Water quality, Path of pollutants, Boron.
Identifiers: Silver, Barium, Selenium, Arsenic, Organic carbon.

A record of joint discussions on water treatment methods in Atlanta, Chicago, Denver, Detroit, Dallas, Philadelphia, and Southern California includes data on the characterization of the waters and concentrations of heavy metals before and after treatment. Other facets of water treatment are also discussed. (Little-Battelle)
W73-06931

WATER PURIFICATION SYSTEM,
M. D. Appleman.
U.S. Patent No. 3,701,728, 5 p, 2 fig, 5 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 903, No 5, p 1652, October 31, 1972.

Descriptors: *Patents, *Waste water treatment, *Water purification, *Water treatment, *Chlorination, Microorganisms, Organic matter, *Filtration, Abatement, Pollution abatement, Water pollution treatment, Water pollution control, Water quality control, Treatment, *Ion exchange, Potable water.
Identifiers: Chemical treatment.

The source water is passed through an ion-exchange unit capable of filtering out part of the microorganisms and other organic matter. At the same time bactericidal chlorine is introduced into the source water in amounts low enough to produce an effluent chlorine concentration in the purified water of less than about 0.2 ppm. Provision is made for removal of chlorine that may be in excess of potable water limits. (Sinha-OEIS)
W73-07002

METHOD OF WATER PURIFICATION,
G. R. Whitten, Jr.
U. S. Patent No. 3,695,434, 6 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 903, No 1, p 150, October 3, 1972.

Descriptors: *Patents, *Water treatment, *Water pruification, Reservoirs, Impounded waters, Treatment, Equipment, *Filtration, *Levees, Skimming, Water levels.

A prefiltering levee is constructed within a body of water to segregate a reservoir portion from the remainder. A water purification unit is installed in the reservoir area. Most of the heavy suspended particles are removed as the water moves through the prefiltering levee. A second filtering pass is provided by the purification unit. This unit includes a mixing chamber, a filtering chamber and a pump for passing water from the mixing chamber through the filtering chamber into the reservoir. A mobile skimming gutter insures a constant intake of surface water at various reservoir water levels. Various purifying chemicals may be added to the processed water. (Sinha-OEIS)
W73-07016

FOAM FRACTIONATION AND PRECIPITATE FLOTATION OF ZINC (II),
Ohio State Univ., Columbus. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-07030

COMBINED CARBON OXIDATION-NITRIFICATION,
Consoer, Townsend and Associates, Chicago, Ill.
For primary bibliographic entry see Field 05D.
W73-07095

5G. Water Quality Control

DEVELOPMENT OF MODEL FOR PRICING WATER IN PROVIDING A BASIS FOR ALLOCATING WATER AMONG COMPETING USES,
Iowa State Water Resources Research Inst., Ames.
J. F. Timmons, J. R. Prescott, and J. J. Jacobs.
Available from the National Technical Information Service as PB-217 864, $3.00 in paper copy, $0.95 in microfiche. Iowa State Water Resources Research Institute Report No. 47, November, 1972. 8 p, 8 ref. OWRR A-036-IA (5). 14-31-0001-3515.

Descriptors: *Water quality, *Water supply, *Cost-benefit analysis, Water pollution, Economic efficiency, Soil conservation.
Identifiers: Parametric programming.

The problem of developing relevant water quality levels for a water supply entity is studied. One objective of the study was to develop a systematic and integrated system for establishing the level of quality for a given water supply. To achieve this objective, it was necessary to identify polluters and water uses by quality constituents, quantify the phsyical linkage of uses, and specify the alternative techniques for diminishing the conflicting quality constituents of the supply. A second objective was to formulate a method to estimate the least-cost means of achieving a particular level of quality and then apply this analytical approach to a water supply area. Another objective was to suggest the major physical, economic, and institutional aspects of a water quality management system. In order to meet these objectives, a model was constructed for estimating costs and benefits of using water for various purposes. Within the framework of the model, the costs of improving water quality to meet certain specified uses were identified. Also, the benefits of improved water quality were estimated using an opportunity cost approach. Additional research needs were also identified. (Settle-Wisconsin)
W73-06507

A STUDY OF PHYTOPLANKTON DYNAMICS IN LAKE FAYETTEVILLE AS A MEANS OF ASSESSING WATER QUALITY,
Arkansas Univ., Fayetteville. Water Resources Research Center.
For primary bibliographic entry see Field 05C.
W73-06510

MATHEMATICAL MODELS OF WATER QUALITY PARAMETERS FOR RIVERS AND ESTUARIES,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 05B.
W73-06520

ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF GREENBELT IRRIGATION, (PHASE 3),
California Univ., Riverside. Dept. of Plant Sciences.
For primary bibliographic entry see Field 05D.
W73-06526

WASHOUT PROCESSES IN LAKE SYSTEMS,
Ohio State Univ. Research Foundation, Columbus.
J. I. Frea, T. Y. Li, and R. M. Sykes.
Available from the National Technical Information Service as PB-217 884, $5.45 in paper copy, $0.95 in microfiche. Completion Report, October 1972. 128 p. OWRR X-117 (No 3724) (1).

Descriptors: *Self-purification, Water chemistry, Aquatic microbiology, Aquatic animals, Aquatic plants, Aquatic environment, Physical properties, Physicochemical properties, Biological properties, *Reviews, *Research priorities, *Waste assimilative capacity, Eutrophication, Water management (Applied), Water pollution, Water pollution control, Water pollution effects, *Water purification, *Washouts.

The literature of natural washout processes was reviewed. The scope of the literature included journal articles, government reports, and reviews of research on those natural phenomena involved in the self-improvement of fresh water systems which result in restoration to their natural state following cessation or controlled reduction of the introduction of abnormal quantities or kinds of matter or influences. Emphasis is on western hemisphere literature appearing after 1960. There are 530 reference citations.
W73-06531

PASSAIC VALLEY SEWERAGE DISTRICT; PASSAIC RIVER BASIN.
For primary bibliographic entry see Field 06E.
W73-06536

DEPARTMENT OF WATER AND AIR RESOURCES.
For primary bibliographic entry see Field 06E.
W73-06538

CITIZENS UTILITIES COMPANY V. ILLINOIS POLLUTION CONTROL BOARD (POLLUTION CONTROL BOARD'S AUTHORITY TO IMPOSE CONDITIONS ON THE GRANT OF A VARIANCE).
For primary bibliographic entry see Field 06E.
W73-06539

ENVIRONMENTAL PROTECTION SUIT--STANDING.
For primary bibliographic entry see Field 06E.
W73-06546

POTOMAC RIVER BASIN COMPACT.
For primary bibliographic entry see Field 06E.
W73-06547

COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM.
For primary bibliographic entry see Field 06E.
W73-06549

OIL DISCHARGE CONTAINMENT, CONTROL AND CLEANUP; WELLS; APPEALS.
For primary bibliographic entry see Field 06E.
W73-06551

POLLUTION ABATEMENT.
For primary bibliographic entry see Field 06E.
W73-06553

POLLUTION CONTROL OF NAVIGABLE WATERS.
For primary bibliographic entry see Field 06E.
W73-06555

CONTROL OF POLLUTION BY OIL.
For primary bibliographic entry see Field 06E.
W73-06556

CONTROL OF POLLUTION BY HAZARDOUS SUBSTANCES.
For primary bibliographic entry see Field 06E.
W73-06557

CONTROL OF SEWAGE FROM VESSELS.
For primary bibliographic entry see Field 06E.
W73-06558

LANDOWNER'S RIGHT TO RELIEF AGAINST POLLUTION OF HIS WATER SUPPLY BY INDUSTRIAL OR COMMERCIAL WASTE.
For primary bibliographic entry see Field 06E.
W73-06559

MAINE LAW AFFECTING MARINE RESOURCES, VOL 5, INDEX TO A STUDY CARRIED OUT UNDER THE JOINT SPONSORSHIP OF: THE SCHOOL OF LAW OF THE UNIVERSITY OF MAINE AND THE NATIONAL SCIENCE FOUNDATION OFFICE OF THE SEA GRANT PROGRAMS.
Maine Univ., Portland. School of Law.
For primary bibliographic entry see Field 06E.
W73-06560

ENVIRONMENTAL PROBLEMS OF THE LAKE TAHOE BASIN.

Hearing--Subcomm. on Air and Water Pollution--Comm. on Public Works, U.S. Senate, 92d Cong, 2d Sess, August 21, 1972. 829 p, 31 fig, 6 plate, 11 map, 14 illus, 23 photo, 9 dwg, 57 tab, 29 chart, 147 ref, 19 append.

Descriptors: *Water management (Applied), *Land management, *Water conservation, *Water analysis, Nevada, Lakes, Administrative agencies, Water resources development, Environmental effects, Water quality control, Public lands, Recreation, Legislation, Zoning, Water distribution (Applied), Building codes, Water law, Ecosystems, Highway effects, Impaired water quality, Conservation.
Identifiers: National Environmental Policy Act, Congressional hearings, *Lake Tahoe.

This hearing took extensive testimony and documentary evidence on every aspect of the ecosystem of the Lake Tahoe region; the text of inquiries concerning the region, and committee reports and studies on each aspect are given. Included are studies on hydrology and water resources, water distribution and water waste collection and the limnology and water quality of the region. Plans for continuation of existing regulatory ordinances and implementation of others to regain the quality of this region are discussed in each study. The Tahoe Regional Planning agency provided a contribution to the hearings. The Planning Agency has taken some very strong stands. There are now in excess of 53 million dollars in claims pending against the Agency for regulation of land use. The hearings are intended to resolve questions and to provide the immediate information, legal and ecological, necessary to work toward the preservation of Lake Tahoe. (Smith-Adam-Florida)
W73-06561

INTERSTATE SANITATION COMMISSION.
For primary bibliographic entry see Field 06E.
W73-06563

WATER AND ICE SUPPLIES.
For primary bibliographic entry see Field 06E.
W73-06564

POLLUTION.
For primary bibliographic entry see Field 06E.
W73-06565

ANDERSON V. NORFOLK AND WESTERN RAILWAY (QUI TAM ACTION UNDER REFUSE ACT).
For primary bibliographic entry see Field 06E.
W73-06568

TOXIC SUBSTANCES CONTROL ACT OF 1972.
For primary bibliographic entry see Field 06E.
W73-06571

A BILL TO AUTHORIZE THE ACQUISITION OF THE BIG CYPRESS NATIONAL FRESH WATER RESERVE IN THE STATE OF FLORIDA, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W73-06573

PUBLIC RIGHTS AND COASTAL ZONE MANAGEMENT,
North Carolina Univ., Chapel Hill. School at Law.
For primary bibliographic entry see Field 06E.
W73-06579

POTOMAC RIVER BASIN COMPACT.
For primary bibliographic entry see Field 06E.
W73-06581

STATE WATER CONTROL LAW.
For primary bibliographic entry see Field 06E.
W73-06582

ST. REGIS PAPER COMPANY V. STATE (NOTICE AS PREREQUISTE TO FINE FOR WATER POLLUTION).
For primary bibliographic entry see Field 06E.
W73-06588

MATTER OF DERHAM V. DIAMOND (CHALLENGE TO CERTIFICATION GRANTED HYDROELECTRIC FACILITY ON ENVIRONMENTAL GROUNDS).
For primary bibliographic entry see Field 06E.
W73-06589

DREDGING ON LONG ISLAND,
Center for The Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06599

QUALITY STANDARDS FOR THE COASTAL WATERS OF LONG ISLAND, NEW YORK,
Center for the Environment and Man, Inc., Hartford, Conn.
L. Ortolano.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, April 1970, 26 p, 3 fig, 1 tab, 15 ref. NSF GH-63.

Descriptors: *Water quality standards, *Planning, *Management, Standards, Public health, *New York, Water utilization.
Identifiers: *Coastal waters, *Long Island, *Water use classification.

Water quality standards have been used as a planning instrument for a number of years. In general, standards and associated water use classification schemes are used to control wastewater discharges to attain specified levels of water quality. This discussion considers the nature and use of water quality standards in relationship to the management of activities in the coastal zone of Long Island. A consideration of what the term 'standards' means in the context of New York State's Public Health Law, as well as the rationale used to establish such standards is presented. A similar analysis of 'classification' is also discussed. The coastal waters of Nassau and Suffolk Counties on Long Island are examined. Two views are discussed. (1) How are the coastal waters of Long Island currently classified. (2) What is the current status of those waters in relationship to the classification. The discussion is concluded with some observations concerning the manner in which the existing standards might be modified in order to make them more precise and more comprehensive. (Davis-Chicago)
W73-06601

PROBLEM OF THE HYGIENIC INVESTIGATION AND SANITARY PROTECTION OF COASTAL WATERS (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
D. N. Loranskii, L. S. Gurvich, and Yu K. Chernus.
Gig Sanit. Vol 36, No 8, p 9-12. 1971.
Identifiers: *Coastal waters, Hygiene, *Water quality control, Pollutant identification.

Joint investigations by various institutes will make it possible to evaluate existing methods for calculating effluent sewage in sea water. Recommendations are given to insure proper water use by the population, and for establishing polluted zones. Special laboratories for protection of seas against pollution could be created in research institutes.--Copyright 1972, Biological Abstracts, Inc.
W73-06604

MUSKEGON LAKE STUDY, A PRELIMINARY POLICY STATEMENT.
West Michigan Shoreline Regional Planning Commission, Muskegon.
For primary bibliographic entry see Field 06B.
W73-06605

ENVIRONMENTAL IMPACT AND WATER DEVELOPMENT,
California Univ., Davis. Div. of Environmental Studies.
C. R. Goldman.
Journal of the American Water Works Association, Vol 64, No 9, September 1972, p 545-549, 4 fig, 10 ref.

Descriptors: *Environmental impact, *Water resources development, *Attitudes, *Social values, Social aspects, Decision making, Planning, Project planning, Regulation, Federal government, Water quality, Cost-benefit analysis.
Identifiers: Environmental quality.

The environmental movement and how environmental interest might be incorporated to achieve a better balance between water development and environmental quality are discussed. There was a time when 'face-changing' a region was an acceptable adjunct to resource improvement, however changes in public attitudes and values have discouraged this acceptance. These attitudes and values are conditioned by man's response to his environment, and the situation is complicated by the fact that individuals respond to the same stimulus in different ways. In order to meet the challenge of incorporating contemporary attitudes toward environmental quality into water-development projects, it is necessary to bring environmental as well as developmental interests into all aspects of water development, particularly the planning. The planning of water projects should be completely separated from the construction and regulatory agencies, and physical, biological, and social scientists should be part of the planning team, together with the traditional engineering and economic talent. It would seem appropriate that this planning agency be established at the Federal level because of the size and scale of most water projects. New methodologies exist and are being created for planning water-quality environments, what remains to be accomplished is effective procedures for incorporating environmental quality into benefit-cost analysis. (Davis-Chicago)
W73-06606

THE WATER POLLUTION HAZARD IN THE IOWA RIVER BASIN, IOWA: A DESCRIPTIVE STUDY OF ATTITUDES AND OPINIONS,
Iowa Univ., Iowa City. Dept. of Geography.
J. Gardner, N. Hultquist, and P. Frankland.
Iowa University, Institute of Urban and Regional Research, Working Paper Series No 10, September 1972, 35 p, 1 fig, 42 tab, 24 ref.

Descriptors: Water pollution, *Water quality, *Attitudes, *Social aspects, *Iowa, *Social values, Management, Social impact, Social change, Hazards.
Identifiers: *Water pollution hazard, *Iowa River, Resource management, Environmental hazard, Public opinion.

Public opinions and attitudes about water quality or the water pollution hazard in the Iowa River basin, Iowa are examined. The aim of the study of public attitudes and opinions about societal problems and issues is to take this type of information into consideration in the resolution of issues and management of resources. In the Iowa River basin human activities and land use both influence and are influenced by water quality, thus one objective is to assess and discuss what individuals see as the impact. Hazard research has shown that the extent to which an environmental hazard impinges on the life support and economic base of a population influences perception of and adjustment to the hazard. Therefore, it is hypothesized that variations in opinions of and attitudes to the water pollution hazard will be closely related to the extent of one's commitment to agricultural activities. The physical and socio-economic characteristics of the Iowa River basin are described, stressing the magnitude, extent and history of water quality problems. From data collected by questionnaire, public opinions and attitudes to the pollution hazard are outlined. Differences are explained on the basis of socio-economic, background, and locational variables. Three subpopulations: citizens, professionals, and activists and their differences are of particular interest. Results are discussed from the viewpoint of solutions or adjustments. (Davis-Chicago)
W73-06609

THE ENGINEERS RESPONSIBILITY IN ENVIRONMENTAL POLLUTION CONTROL.
National Industrial Pollution Control Council, Washington, D.C. Process and Systems Engineering Sub-Council.

Sub-council report prepared for the Secretary of Commerce, 22 March 1971, 18 p.

Descriptors: *Environmental control, *Pollution abatement, *Engineering personnel, Water resources, Cities, Social aspects, Political aspects, Environment, Education, Coordination, Costs, Ethics, Technology.
Identifiers: *Interdisciplinary studies, Technological advance.

The rapidity and extent of technological advances of the past 50 years have resulted in certain adverse effects upon the environment and water resources, especially in urban areas. Recently the attention of technologists and the general public alike has been directed more forcibly to environmental questions, particularly with respect protection and control measures. Certain of the engineer's responsibilities in these matters are outlined, recognizing the desirability of producing technological solutions which are in harmony with the social and political demands of society as a whole. The engineer, in addition to his traditional role, should: provide technical leadership in detecting and defining environmental problems and in solving them imaginatively and effectively, employing a realistic evaluation of the costs involved; develop improved lines of communication, understanding, knowledge, and empathy in working with the political and social sciences towards common objectives, and encourage greater awareness of the value of interdisciplinary approaches to environmental solutions, helping to organize, coordinate, and implement such programs when needed; strengthen interchange with the public at large; develop closer working relationships with educational institutions and professional societies; and recognize that the commitment to environmental pollution control must be national in scope, giving due regard to the demands and needs of all people, not only for a higher standard of living, but for a better quality of life. (Davis-Chicago)
W73-06612

INSTITUTIONAL DESIGN AND ENVIRONMENTAL MANAGEMENT; THE TAHOE REGIONAL PLANNING AGENCY,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 06E.
W73-06614

SUMMARY OF THE DRAFT ENVIRONMENTAL ASSESSMENT, POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY.
VTN, Las Vegas, Nev.
For primary bibliographic entry see Field 05D.
W73-06616

WATER QUALITY MANAGEMENT IN THE SALT CREEK BASIN INCLUDING THE LINCOLN METROPOLITAN AREA.
Nebraska Soil and Water Conservation Commission, Lincoln. Salt Valley Watershed District.

April 1972, 153 p, 30 fig, 58 tab, 32 ref, 4 append.

Descriptors: *Water quality, *Water quality control, *Management, Water quality standards, Facilities, Pollution abatement, Water pollution sources, Water pollution control, Cost analysis, Non-structural alternatives, Water utilization, Municipal wastes, Industrial wastes, Agricultural runoff, Recreation, Storm runoff, Waste water treatment, Legal aspects, Planning, *Nebraska.
Identifiers: *Lincoln (Nebraska), *Salt Creek Basin, Cost-effectiveness study.

In general, the interim management plan attempts to go as far as possible in indicating a program which would improve or maintain the water quality in the study area while meeting the applicable state standards, and to provide for orderly and economic development of the pollution control facilities needed. Major objectives of the plan include: (1) define the contribution of point waste discharges, non-point sources, and natural runoff to water quality problems in the Basin; (2) allocate the waste carrying capacity of the receiving waters to these sources in accordance with existing water quality standards; (3) outline a cost-effective strategy for achieving and maintaining the desired water quality goals, including nonstructural as well structural measures; (4) evaluate the existing water use classification system; (5) assess the extent to which standards are met in the Basin; and (6) recommend needed changes in the water quality standards. The following topics are discussed: (1) socio-economic characteristics, (2) occurrence and quality of water, (3) municipal wastes, (4) industrial waste, (5) agricultural runoff, (6) special problems such as water recreation and storm water runoff, (7) waste treatment needs and alternatives, (8) the legal basis for the plan, and (9) a management plan. (Davis-Chicago)
W73-06617

1972 OBERS PROJECTIONS ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 1: CONCEPTS, METHODOLOGY, AND SUMMARY DATA.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06B.
W73-06620

NATIONAL ASSESSMENT OF TRENDS IN WATER QUALITY.
Enviro Control Inc., Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-06628

HYGIENIC PROBLEMS RELATED WITH THE MULTI-PURPOSE USE AND PROTECTION OF WATER RESOURCES IN POLAND, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
V. I. Zueva.
Gig Sanit. Vol 36, No 8, p 83-85. 1971.
Identifiers: *Water quality control, Hygiene, Industrial wastes, *Multi-purpose projects, *Poland, Water resources, Wastes.

Favorable experience was gained in the multipurpose use and protection of water resources in Poland. A Water Law defined the main principles concerning the use of water resources and established the responsibilities of water consumers. The Central Water Management Department handles problems of planning, record-keeping, distribution, and protection of water resources in the country. Despite these efforts, the waters of Poland cannot be considered pure due to difficulties in regulating the discharge of unpurified and underpurified waste waters by industrial plants. Copyright 1972, Biological Abstracts, Inc.
W73-06634

ABSTRACT OF PROCEEDINGS, HAZARDOUS POLLUTING SUBSTANCES SYMPOSIUM: ANNEX 1 TO STUDY ON CONTROL OF HAZARDOUS POLLUTING SUBSTANCES HELD AT JUNG HOTEL, NEW ORLEANS, LOUISIANA ON 14-16 SEPTEMBER 1970.
Coast Guard, Washington, D.C.

Available from the National Technical Information Service as PB-195 342, $6.00 in paper copy, $0.95 in microfiche. Final Report No HSCG-HPS-1, September 16, 1970. 561 p.

Descriptors: *Water Quality Act, *Water pollution sources, *Water pollution control, *Pollutant identification, Accidents, Oil, Water quality control, Effluents, Water pollution effects, Toxicity, Food chains, Aesthetics, Hazards, Bioindicators, Chemical wastes, Monitoring, Legal aspects, Sea water.

In conjunction with the study requirements set forth in Section 12 (g) of the Water Quality Improvement Act of 1970, a symposium was held with its principal objective being the solicitation of the views of industry, academic leaders, conservationists, state governments and other non-federal government spokesmen on the identification of and response to the uncontrolled release of hazardous polluting substances into the navigable waters of the United States. The symposium employed a panel format encompassing three areas: (1) definition and classification; (2) prevention, detection, and removal; and (3) legal and economic factors. This report contains an abstract of the comments made by some 400 interested parties, along with the recommendations made by each panel. (Mortland-Battelle)
W73-06654

CLARIFYING SYSTEM SEPARATES EMULSIFIED OILS FROM WATER.
Tenco Hydro/Aeroscience, Inc., Chicago, Ill.
For primary bibliographic entry see Field 05D.
W73-06673

THERMAL POLLUTION CONTROL IN MASSACHUSETTS COASTAL WATERS,
Massachusetts Water Resources Commission, Boston. Div. of Water Pollution Control.
J. R. Elwood.
Journal New England Water Pollution Control Association, Vol 6, No 1, p 18-30, June 1972. 4 fig.

Descriptors: *Temperature, *Massachusetts, *Thermal pollution, *Powerplants, *Water pollution control, Thermal powerplants, Water pollution, Legislation, Disinfection, Heat transfer, Marine animals, Environmental effects, Nuclear powerplants, Dissolved oxygen, Heated water.
Identifiers: *Waste heat, Heat discharges.

Experience in thermal pollution control is drawn form several powerplants. It is recommended that a preliminary hydrothermal and ecological study of the receiving water including benthic studies be accomplished before any serious consideration can be given to expanding an existing plant or developing a new site. Usually physical hydraulic model study is required to predict the dispersing pattern of the heated water discharges under varying conditions. When the Division and other State agencies which have affected responsibilities are satisfied that there will not be any significant adverse effects on the marine resources or other use of the water, an interim permit is issued, usually for a period of three years from the date of plant start-up. Furthermore, the conditions of the permit are discussed as is the work of the coordinating Administrative Technical Advisory Committee. (Oleszkiewicz-Vanderbilt)
W73-06688

U.S. AND CANADA AGREE ON ANTI-POLLUTION MEASURES FOR THE GREAT LAKES.

EOS Transactions of the American Geophysical Union, Vol 52, No 8, p 581-582, July 1971. 2 photos.

Descriptors: *Water pollution, *Planning, *Lake Ontario, Lake Erie, *Governments, On-site investigation, International commissions, Nitrogen, Phosphorus, Eutrophication, Aquatic algae, Bacteria, Oxygen sag, Turbidity, Water pollution control, Effluents, Thermal pollution.

A joint commission report on Lake Ontario and Lake Erie, and a recent executive agreement between the U.S. and Canada to restore the Great Lakes boundary area are discussed. Lake Ontario and Lake Erie were both found to be highly polluted resulting in eutrophication. Heavy nutrient enrichment from increased amounts of nitrogen and phosphorus coupled with great oxygen depletion have brought on considerable algal increase, a change in the basic type of inhabitant fish and a bacterial concentration increase. Pollution and its effects were found to be greater in Lake Erie, especially in the area around Cleveland. The commission recommended protection against effluents which would form sludges and putrescent deposits harmful to life, control of nutrient levels to prevent algal blooms, and elimination of oil and flotsam from industrial and municipal discharges. Canada has begun to set up national limits while the U.S. was relying on local and state regulation, at the time this article was published. (Jerome-Vanderbilt)
W73-06689

BY-PRODUCTS OF NUCLEAR POWER,
Atomic Energy Research Establishment, Harwell (England). Separation Processes Group.
H. A. C. McKay.
Chemistry and Industry, No 7, p 275-280, April 1972. 4 fig, 1 tab, 25 ref.

Descriptors: *Nuclear powerplants, *Thermal pollution, *Radiation, *Beneficial use, Nuclear wastes, Breeder reactors, Desalination, Electric power production, Waste disposal, Fish farming, Heat, Dispersion, Ocean, St. Lawrence River.

It seems likely that many more nuclear powerplants will be necessary to meet the electrical needs of the future. The various by-products resulting from such electrical generation (i.e., waste heat, neutrons, gamma rays, fission products, neutron reaction products, beta-particles, antineutrinos, depleted uranium, and irradiated materials) and the benefits and liabilities which accompany them are discussed. Projects, involving heated water, now in operation and some which are in the planning stage are discussed. Possible uses of radioactive materials are also considered. Although several difficulties in the establishment of a large nuclear generating facility are cited, fear of radioactive pollutionis exaggerated and protests against nuclear powerplants are short-sighted. (Jerome-Vanderbilt)
W73-06699

PHYSICAL AND ECONOMIC FACTORS ASSOCIATED WITH THE ESTABLISHMENT OF STREAM WATER QUALITY STANDARDS,
Iowa State Univ., Ames.
M. D. Dougal.
Available from University Microfilms. 300 N. Zeeb Rd, Ann Arbor, Michigan, 48106. Order No 70-13, 581. Price: $71.00, microfilm $19.85. Ph. D. Dissertation, 1,578 p, 1969.

Descriptors: *Water pollution control, *Water quality control, *Computer models, Oxidation, Nitrification, Nutrient removal, Phosphates, Algae, Oxygen, Cost analysis, Economics, Regional development.
Identifiers: *Stream water quality.

The relation of water pollution control and stream water quality to the establishment of stream and effluent standards was studied. A field research program led to the development of a digital computer model for simulating, verifying and forecasting stream water quality. The results have shown that 3 major factors influence stream water quality: (1) oxidation of the carbonaceous organic waste substances contained in effluents, (2) nitrification of nitrogenous compounds and (3) the effect of nutrient levels, such as phosphates, in causing an algal response leading to oxygen

production in the daytime but creating a serious respiration liability at night. A cost analysis of water pollution control is included. Additional research is recommended in the area of physical and economic implications of the establishment of stream water quality standards especially in the regional management of water quality. (Smith-Texas)
W73-06759

SOME ASPECTS OF PREDICTING THE SANITARY STATE OF WATER BODIES,
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
L. S. Gurvich, V. I. Zueva, I. A. Kibal'chich, V. A. Savelova, and N. R. Effendiev.
Available from the National Technical Information Service as part of TT71-50122/1, $3.00 in paper copy, $0.95 in microfiche. Hygiene and Sanitation, Vol 36, Nos. 1-3, p 8-12, January-March, 1971. 3 ref. Trans from Gigieny i Sanitariya.

Descriptors: *Water pollution control, *Water quality control, *Water pollution, *Water quality, *Pollution abatement, Environmental sanitation, Disinfection, Potable water, Public health, Sewage treatment, Water purification, Water supply.
Identifiers: *Soviet legislation, *USSR.

Hygienic investigations to predict the sanitary state of water bodies should follow these steps: (1) accumulation of data on the dynamics of the sanitary state of water bodies, (2) elucidation of factors facilitating pollution of water bodies, and (3) investigation of the efficiency of pollution control measures. Experience has confirmed the feasibility of the participation of hygienic institutions in the development of schemes for comprehensive utilization and conservation of water resources in large economic regions of the U.S.S.R. (Smith-Texas)
W73-06766

ON A NEW BIOLOGIC AGENT FOR NATURAL SELF-PURIFICATION OF WATER BODIES,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05D.
W73-06781

TIDAL CIRCULATION AND SEWAGE POLLUTION IN A TROPICAL MARINE LAGOON,
Trust Territory of the Pacific Islands, Koror, Caroline Islands. Entomology Lab.
For primary bibliographic entry see Field 05B.
W73-06795

HUMBLE ADDS SKIMMING BARGE TO ITS DOCKSIDE-CLEANUP FLEET,
R. C. Ewing.
The Oil and Gas Journal, Vol 70, No 45, p 80-81, November 6, 1972. 2 fig.

Descriptors: *Oil wastes, *Oil spills, *Oil industry, *Water pollution control, Industrial wastes, Water pollution sources, Water quality control, Oil, Pumping, *Louisiana.
Identifiers: *Baton Rouge (La).

Humble engineers worked with a local contractor, Conveyco Inc., in Baton Rouge, Louisiana, to design an oil collecting barge aimed at recovering any spill that might occur in the company's dock area. The barge is essentially a floating skimmer that gravitates oil to a sump. Oil gravitates through the skimmer to the oil sump until the sump level rises to the water level in the central section of the barge. It will then stop flowing through the skimmer until the sump is pumped out. With a large spill, skimming rate can be maximized by pumping the sump continuously. (Smith-Texas)
W73-06797

'INFLATABLE' DAMS CONTROL CHLORIDE INTRUSION,
E. E. Halmos, Jr.
Water and Sewage Works, Vol 119, No 10, p 73, October, 1972.

Descriptors: *Water pollution, *Water pollution control, *Water quality control, *Water quality, Brines, Chlorides, Flood control, Dam design, Dams, Surface waters, Storm runoff, Injection wells.
Identifiers: *Texas-Oklahoma border, Chloride intrusion.

Installation of 4 inflatable dams or weirs is planned by the Army Corps of Engineers as part of an extensive program to control chloride intrusion into waterways near the Texas-Oklahoma border. In times of high water the dam is automatically deflated whenever stream flow tops the dam by 6 inches. Deflated, it lies on the concrete slab and permits peak flows to pass on. Deflation requires about an hour and full inflation takes about 3 hours. Air or water can be used for inflation. The Army Corps of Engineers hopes to dam off the salt producing areas where heavy brine is produced when rains or flood waters percolate into the chloride deposits and dispose of the brines through injection wells or other means. (Smith-Texas)
W73-06798

CHANGES IN RIVER WATER QUALITY RESULTING FROM ORGANIC-FREE EFFLUENTS CONTAINING AMMONIA,
New York, Univ., N.Y. School of Engineering Science.
For primary bibliographic entry see Field 05B.
W73-06799

PHOSPHATE REMOVAL FROM SEA WATER BY ADSORPTION ON VOLCANOGENIC FERRIC OXIDES,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 02K.
W73-06844

ECOLOGICAL IMPACT OF WATER RESOURCE DEVELOPMENT--A TECHNICAL SESSION OF THE SYMPOSIUM, 'WATER, MAN, AND NATURE'.
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.

Available from NTIS, Springfield, Va 22151 as PB-210 838 Price $3.00 printed copy; 95 cents microfiche. Report REC-ERC-72-17, June 1972. 28 p.

Descriptors: *Water resources development, *Water quality, *Engineering structures, *Environmental effects, *Aquatic environment, Fish reproduction, Reservoir operation, Water level fluctuations, Road construction, Canals, Streams, Natural resources.

Four papers describe a sequence of ecological impact analysis, ranging from predicting the consequences of planned management programs to descriptions and evaluations of current programs. Use of preproject ecological surveys, bioassays, and laboratory scale models are described. Structures to increase fish habitat in changed river channels are evaluated and recommendations are made for increasing or maintaining the level of production in changed river systems. These papers were presented at the symposium on Water, Man, and Nature, cosponsored by the Bureau of Reclamation and the American Institute of Biological Sciences at Colorado State University, Ft. Collins, Colo, August 30-31, 1971. Thirty-four references are included. (See W73-06848 thru W73-06850) (Woodard-USGS)
W73-06847

ECOLOGICAL DATA FOR WATER RESOURCES MANAGEMENT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
K. L. Dickson, and J. Cairns, Jr.
In: Ecological Impact of Water Resource Development--A Technical Session of the Symposium 'Water, Man, and Nature': Bureau of Reclamation Report REC-ERC-72-17, p 1-6, June 1972. 2 fig, 4 ref.

Descriptors: *Water resources development, *Watershed management, *Water quality control, *Pollution abatement, *Monitoring, Data collections, Ecology, Reviews, Evaluation, Water pollution sources, Streams, Path of pollutants.

Present advances in biological monitoring combined with physical and chemical monitoring capabilities indicate that in the near future we can develop and operate a river basin with varied water resource uses to maximize beneficial use without ecological damage. A river basin management system which includes reservoirs, agricultural uses, industries and towns, is illustrated. Conceptually, utilizing a central control center and rapid physical, chemical, and biological monitoring systems, ecological damage could be prevented through the operation of the system as a whole rather than each water resource user being concerned only with his own discharge. If an industry in the system had a spill of toxic material which was rapidly detected through the continuous monitoring systems, the following activities might be coordinated by the control center: (1) upstream reservoirs could increase discharges for dilution of toxicants, (2) municipal water users could curtail use of water and depend on reserves until toxicity was dissipated; and (3) downstream industries could shunt to holding ponds to prevent synergistic interactions. The water resources management scheme depends on the cooperative activities of State and Federal government as well as private users of water resources. (See also W73-06847) (Woodard-USGS)
W73-06848

ECOLOGICAL IMPACT OF FLUCTUATING WATER LEVELS IN RESERVOIRS,
Virginia Cooperative Fishery Unit, Blacksburg.
R. D. Estes.
In: Ecological Impact of Water Resource Development--A Technical Session of the Symposium 'Water, Man, and Nature': Bureau of Reclamation Report REC-ERC-72-17, p 7-9, June 1972. 16 ref.

Descriptors: *Water level fluctuations, *Reservoirs, *Ecology, *Fish, *Reservoir operation, Reviews, Evaluation, Water temperature, Fisheries, Fish types, Environmental effects, Ecosystems, Streams, Fish reproduction.

The littoral zone is the most important area of a reservoir from the standpoint of fishes and other higher animals and plants. Reservoirs usually require the use or eventual release of water for hydroelectric power production, for domestic and industrial water supply, for irrigation, or flood control. Seldom does the demand for the water coincide with the supply; therefore, changes in the volume of water occur. Even reservoirs designed for nonconsumptive usage of water, such as navigation or recreation, usually undergo some fluctuation of water levels. The greatest concern to fishery biologists regarding fluctuation has been the effects on the reproduction of fishes. Results from numerous studies on reservoir fishery management indicate that the general consensus is that water-level fluctuation may cause loss of Centrachidae eggs but usually not a complete failure of a year-class. (See also W73-06847) (Woodard-USGS)
W73-06849

INTEREST GROUPS, INTERGOVERNMENTAL RELATIONS, AND THE ENVIRONMENT: A STUDY OF HOW A $200 MILLION INDUSTRIAL COMPLEX WAS PREVENTED IN SOUTH CAROLINA,
Florida State Univ., Tallahassee. Dept. of Government.
For primary bibliographic entry see Field 06E.
W73-06858

SURFACE OXIDATION OF THE VISTULA NEAR OSWIECIM,
H. Przybylski.
Available from the National Technical Information Service as Part of TT 70-55098/5, $3.00 in paper copy, $0.95 in microfiche. Translated from Gospodarka Wodna, Vol 30, No 5, p 49-56, 1970. 1 fig, 13 ref.

Descriptors: *Pollution abatement, *Water pollution, *Rivers, Costs, Biochemical oxygen demand.
Identifiers: *Poland, *Vistula River.

The Vistula River in Poland has lost practically all of its natural features due to pollution. Investigations undertaken above the inflow from the Sola River indicated that from 1.5 to 2.5 million organisms are found in one milliliter of water, 38 percent of which consisted of live polysaprobes, 44 mezosaprobes, and only 18 percent oligosaprobes. Only 50 percent of the oligosaprobes were confirmed to be alive. Another investigation, near the intake of the Przemsza River, indicated that the quantity of dissolved oxygen falls below 4 mg/l for as long as 8 months and below 2 mg/l for as long as 5 months. This latter measure represents the lower bound for the existence of aerobic life in the river. The first step toward reversing the destruction of the Vistula's self-purification ability is to assure sufficient quantities of oxygen. The quantity ought to be such that mineralization processes can occur, i.e. that aerobic organisms would participate in the self-purification process. An analysis of the cost of pollution abatement procedures suggests that the cost of introducing 1 kg oxygen into the river is approximately 1.24 zlotys. (Settle-Wisconsin)
W73-06860

THE CHRISTINA PROJECT: ENVIRONMENTAL PROTECTION IN URBAN GROWTH AREAS,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 06G.
W73-06864

TAXATION AND WATER POLLUTION CONTROL,
Pennsylvania State Univ., University Park. Dept. of Economics.
T. A. Ferrar, and A. Whinston.
Natural Resources Journal, Vol 12, No 3, p 307-317, July 1972. 2 fig, 3 ref. OWRR B-020-IND (21). 14-31-0001-3080.

Descriptors: *Pollution taxes (Charges), Water pollution control, *Taxes, *Water quality standards, Standards, Management, Effluents, Waste treatment, Polluters, Marginal costs, Algorithms, Mathematical models, Systems analysis.
Identifiers: *Environmental property rights, *Optimal allocation, Cost curves, Water control board.

'Effluent charge' water resource management, one of the most strongly advocated methods of water quality administrative control, is examined. The attributes and shortcomings of this technique are discussed, and an alternative water quality management approach is described and is demonstrated as being superior. Presented is a reasonable economic situation where the effluent charge technique breaks down and the prescirbed alternative method operates efficiently. It is argued that this situation is likely to be found in regions experiencing acute water quality problems. The proposed alternative approach depends upon the existence of a Water Control Board with legal responsibility for specifying a standard of water quality and enforcing this standard in the region's watercourses. Proposed is a scheme involving the direct allocation of environmental property rights or user permits among potential polluters of a watercourse. Involved is an incentive-feedback algorithm that iteratively allocates the available environmental resources among the polluters in accordance with cost minimization criteria of the Water Control Board. (Bell-Cornell)
W73-06865

A MINERAL ECONOMICS APPROACH TO ENVIRONMENTAL CONTROL,
Pennsylvania State Univ., University Park. Dept. of Mineral Economics.
G. H. K. Schenck.
Mining Engineering, Vol 23, No 9, p 52-54, September 1971. 3 fig.

Descriptors: *Mineral industry, *Economics, *Waste identification, Waste treatment, Solid wastes, *Recycling, Heavy metals, Environmental effects, Legislation.
Identifiers: Zoned discharge.

Two examples - a zoned discharge fee and innovation of recycling systems - illustrate the type of changes in the mineral industry that would lead to an improved environment. The first requires that ownership of the relevant public resources be vested in control agencies. The second indicates that profit opportunities existing in solid waste recycling should facilitate innovation. Both concepts can reduce environmental loadings but will require imaginative thought from persons in the mineral industries. (Oleszkiewicz-Vanderbilt)
W73-06886

RECYCLING ZINC IN VISCOSE RAYON PLANTS BY TWO STAGE PRECIPITATION.
American Enka Corp., N.C.
For primary bibliographic entry see Field 05D.
W73-06890

STUDY ON THE REMOVAL OF CADMIUM ION FROM MINE WATER BY AN UTILIZING OF XANTHATE AS SELECTIVE PRECIPITANT,
Iwate Univ., Morioka (Japan).
For primary bibliographic entry see Field 05D.
W73-06891

WATER INFILTRATION CONTROL TO ACHIEVE MINE WATER POLLUTION CONTROL - A FEASIBILITY STUDY,
West Virginia Dept. of Natural Resources, Charleston.
Frank J. Zaval, and John D. Robins.
Copy available from GPO Sup Doc as EP1.23/2:73-142, $2.35; microfiche from NTIS as PB-217 886, $0.95. Environmental Protection Agency, Technology Series Report EPA-R2-73-142, January 1973. 185 p, 48 fig, 43 tab, 9 ref. EPA Project 14010 HHG.

Descriptors: *Acid mine drainage, Underground structures, *Land reclamation, Revegetation, Water quality, *Infiltration, *West Virginia, Monitoring, Feasibility studies, Acid mine water, Water pollution control.
Identifiers: *Seals - mine entry, *Reclamation - strip mine, Surface mines.

The study objective was the determination of the feasibility of conducting a full-scale demonstration to document the effectiveness of land reclamation at mined-out areas, in establishing surface water infiltration control to prevent acid mine water pollution. The study site was the Dents Run Watershed, Monongalia County, West Virginia. It is replete with strip, drift, and auger mines, refuse dumps, and discharge boreholes; all of which are significant potential contributors of acid mine water pollution. The project is feasible as based upon the results of investigative measures which included: investigation of each mine area and opening; a detailed description of each site; sampling and analysis of all receiving streams and discharge points to determine the severity of acid mine water pollution; and evaluation and selection of weir structures, monitor and enclosures and instruments to be placed in unattended areas to provide a continuous record of stream conditions. Recommendations and cost estimates are presented for reclamation at each site and for the installation of monitoring facilities. The impact of the project on the social and economic environment of the watershed and the county is presented. (EPA)
W73-06892

THE BENEFICIAL USE OF STORM WATER,
Hittman Associates, Inc., Columbia, Md.
C. W. Mallory.
Copy available from GPO Sup Doc as EP1.23/2:73-139, $2.85; microfiche from NTIS as PB-217 506, $0.95. Environmental Protection Agency, Technology Series Report EPA-R2-73-139, January 1973. 266 p, 54 fig, 51 tab, 49 ref. EPA Project 11030 DNK. 68-01-0173.

Descriptors: *Storm runoff, *Reservoir storage, Water pollution treatment, Water supply, *Water conservation, Synthetic hydrology, Regression analysis, Water demand, Water distribution, System analysis, Optimum development plans, Erosion control, Sediment control, *Maryland.
Identifiers: Storm water management, *Columbia (Maryland), *Storm water reuse.

This report covers work originally performed by Hittman Associates in 1968 under Contract 14-12-20. (See W71-00409). A system study was conducted to determine the technical and economic feasibility of using small storage reservoirs throughout an urban community as a means of storm water pollution control. Facilities were provided to treat the water prior to release or to provide sub-potable or potable water for use in the community. A conventional approach to controlling storm water pollution was defined for comparative purposes. Computerized system analysis was used to select the optimal combinations of reservoir locations, type of treatment, and type of reuse on a least cost per day basis. Alternatives were ranked and the optimal practical solution determined considering the constraints. It was determined that the use of local storage and treatment does represent a feasible and economical method for storm water pollution control. Further, the treated water can supply a large portion of the fresh water demands of a typical urban residential community. A demonstration program was planned and subsequently implemented to evaluate erosion and sediment control practices which includes a three-and-one-half-lake, evaluation of cleaning and sediment handling methods, and sampling and gaging stations to monitor changes in water quality and hydrology during urban development. (EPA)
W73-06893

WATER SUPPLY AND SOLID WASTE FACILITIES, ALLEN COUNTY, OHIO.
Jones and Henry Engineers, Ltd., Toledo, Ohio.
For primary bibliographic entry see Field 06B.
W73-06898

WATER QUALITY MANAGEMENT PLAN FOR THE KANSAS CITY METROPOLITAN REGION, PHASE I.
Black and Veatch, Kansas City, Mo.

Report prepared for the Mid-America Regional Council, Kansas City, Missouri, April 1972. 43 p, 4 fig, 8 tab, 3 append, 39 ref.

Descriptors: *Water quality, *City planning, *Management, *Water quality control, Water pollution, Water pollution control, Industrial wastes, Municipal wastes, Monitoring, Missouri, Kansas.
Identifiers: *Kansas City Metropolitan Region, Metropolitan water resources management.

The following are identified and evaluated for the Kansas City Metropolitan region: (1) available water pollution studies - reports, plans and proposals; (2) available industrial waste discharge quality and quantity information along with location in the region and stream receiving such discharge; (3) available water quality monitoring information, including the location, extent and reliability of such information; and (4) identification and location of problem areas and voids data which must be explored to meet needs for a fully developed plan by July 1973. In addition, an estimate was prepared of the cost involved in carrying out the second phase of the study intended to complete the fully developed Metropolitan Area Water Pollution Control Plan. (Davis-Chicago)
W73-06901

LIMNOLOGY AND WATER QUALITY OF THE LAKE TAHOE REGION, A GUIDE FOR PLANNING.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.

July 1971. 14 p, 2 tab, 6 ref.

Descriptors: *Limnology, *Water quality, *Planning, *Urbanization, Water pollution sources, Ecosystems, Soil stabilization, Storm drains, Storm runoff, Sedimentation, Groundwater recharge, Waste water treatment, Urban runoff, Pesticides, Nutrients, *California, *Nevada.
Identifiers: *Lake Tahoe, Streamside environmental zones.

This review of the water quality of Lake Tahoe provides several conclusions and recommendations pertinent to planning. Knowledge of the aquatic ecosystem in the Lake Tahoe Basin is so limited that the ecosystem can be described only by broad trends and care must be taken in predicting the effects of increased human population in the basin. Available data indicate that the waters of Lake Tahoe are still relatively pure. Some typical initial signs of pollution are appearing in some tributary streams and several near-shore areas of the Lake. The similar deterioration of the aquatic ecosystem caused by urbanization in other areas is starting in the Tahoe Basin. Corrective and preventive action should be taken before the final results of these trends become apparent. Several recommendations are: (1) begin soil stabilization practices in these areas contributing sedimentation and require such practices to be followed in future development; (2) Improve existing and future storm drainage facilities; (3) Consider reduction of area of impervious surfaces and retention of some storm water on-site to be percolated into the soil; (4) Prohibit discharge of petroleum and other toxicants into Lake Tahoe, streams and storm drainage systems; (5) Investigate the effects of fertilizers in the Tahoe Basin; (6) Establish streamside environmental zones on each side of all annual streams; (7) Use only pesticides that have been proved to be environmentally safe; (8) Do not introduce new species into the aquatic ecosystem until ecologic effects have been studied and proven safe; (9) investigate the role of nutrients in the Lake Tahoe ecosystem. (Davis-Chicago)
W73-06905

COMPREHENSIVE WATER AND SEWERAGE PLANNING, GRAYSON COUNTY TEXAS.
Freese, Nichols and Endress, Fort Worth, Tex.
For primary bibliographic entry see Field 06B.
W73-06914

COMPREHENSIVE SANITARY SEWERAGE AND STORM DRAINAGE FACILITIES PLAN FOR THE INCORPORATED COMMUNITIES, PREPARED FOR LIMA - ALLEN COUNTY REGIONAL PLANNING COMMISSION.
Browne (Floyd G.) and Associates Ltd., Marion, Ohio.

1970. 302 P, 71 FIG, 9 TAB, 23 REF, 7 APPEND.

Descriptors: *Sewerage, *Drainage, *Facilities, *Comprehensive planning, Project planning, Coordination, Social aspects, Financing, Priorities, Long-term planning, Short-term planning, *Ohio.
Identifiers: *Lima (Ohio), *Storm drainage.

The objective of the sanitary sewerage and storm drainage facilities plan is to provide a comprehensive plan for the development of needed improvements in the Lima area in a coordinated and orderly manner. It presents a program which provides for the coordination of the various governmental agencies so that potential economic and social benefits which are possible with proper planning may be realized. Information is presented on the major facilities within each individual community and the need for improvements therein. The plans for the facilities are presented to meet anticipated needs in two phases, (1) an immediate program and financing requirements to serve the anticipated needs of the area for the decade 1970-1979; and (2) a long range plan to outline the projected needs for the decade 1980-1989. Priorities have been placed on the program for the first decade to provide further guidance in financing programs. (Davis-Chicago)
W73-06917

INTERIM PLAN FOR WATER QUALITY MANAGEMENT, EL PASO AND TELLER COUNTIES.
Pikes Peak Area Council of Governments, Colorado Springs, Colo.

August 1971, 90 p, 5 fig, 14 tab, 6 map. HUD-COLO-P-98.

Descriptors: *Water quality, *Management, *Planning, Decision making, Coordination, Political aspects, Water quality control, Water pollution, Water pollution control, Water policy, Facilities, Land use, Community development, Governments, *Colorado.
Identifiers: *Water quality management, *Colorado Springs (Colo).

This interim plan for water quality management in the Pikes Peak Water Quality Management Region was designed to examine the state of planning and management in general terms. Current problems, available information, and presently adopted plans which affect the quality of the region's water are described. A plan of action is presented for the coming two years so that more detailed plans, management, and implementation activities may be undertaken in a logical, economical sequence. The essential objective of water quality management, from both a planning and implementation viewpoint, is to provide for an improved social and physical environment. This objective will be achieved by the abatement of water pollution and its concommitant benefits. However, the objective will only be achieved if plans are implemented directly, by the construction of facilities and the promulgation of enforceable policies, and indirectly, via correct land use and related development decisions. Implementation rests mainly in the hands of local governments and service districts and it is their efforts which are essential to the successful management of the region's water resources. The plan was further designed to increase the cooperation and coordination among local entities. To this end, a Water Quality Management Committee has been established, composed of representatives of local utilities, planning agencies, and political jurisdictions. This committee was instrumental in the preparation of the interim plan, and will provide the nucleus of technical expertise for a more complete planning and implementation effort. (Davis-Chicago)
W73-06921

ASSAULT ON A LAKE,
For primary bibliographic entry see Field 05B.
W73-06925

APPARATUS FOR RECOVERY OF FLOATING SUBSTANCES,
E. Flaviani.
U.S. Patent No. 3,700,107, 6 p, 30 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1260, October 24, 1972.

Descriptors: *Patents, Flotsam, *Oil spills, *Oil pollution, Equipment, *Skimming, *Separation techniques, Abatement, *Pollution abatement, Water quality control, Water pollution control.

A propelled hull has an open front upon which a scoop is mounted. The scoop lifts flotsam, oil, or liquid contaminants from the surface of the water. The unwanted material is transferred from one cylinder to another and the liquids are separated. The waste liquid is retained while the water is returned to the surface of the body of water. (Sinha-OEIS)
W73-07001

OIL SKIMMER,
R. L. Tuttle.
U.S. Patent No. 3,701,430, 4 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 903, No 5, p 1583, October 31, 1972.

Descriptors: *Patents, *Skimming, *Flotsam, *Oil spills, *Oil pollution, Abatement, *Pollution abatement, Separation techniques, Water quality control, Water pollution control, Equipment.

The skimmer comprises a barge with one or more extendable outriggers formed as a flat scoop which converges toward the rear. The outrigger can be lowered just below the surface of the water to collect oil converge it toward the rear into a collector sump. Floating debris may also be removed. The outriggers may be adjusted to compensate as the barge sinks lower into the water upon being filled with oil or flotsam. By the addition of flexible leading edges to the outriggers, the skimmer can be used under swell conditions. The system may also include a device for separating the onboard oil from water so that it carries a lesser load and may continue operating for a longer period. (Sinha-OEIS)
W73-07004

SKIMMER FOR REMOVING FLOATING MATTER FROM A BODY OF LIQUID,
Hoyt Corp., Rogers, Ark. (assignee).
O. C. Schell.
U. S. Patent No. 3,701,429, 3 p, 3 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 903, No 5, p 1583, October 31, 1972.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, Equipment, Abatement, *Pollution abatement, Water quality control, Water pollution control.

This skimmer comprises an annular float adapted to float on the surface of a body of water. The upper surface declines from the periphery to a centrally located well. Oil is drawn over the inclined surfaces and flows over the weir and collects in a central sump. The float has upright sleeves extending above the surface and spaced around the float and these are open at both ends. A pump in the well evacuates the skimmed material and a conduit conveys it to a remote location. The

weir is raised by an annular float disposed in the sump when the overflow is too great to be removed by the pump. A ballast chamber makes possible a rough adjustment of the draft of the skimmer. The peripherally spaced marginal floats disposed upright are vertically adjustable to trim the skimmer and make possible a fine adjustment of the draft. (Sinha-OEIS)
W73-07005

BUOYANT PULLEY LOCATING AND ANCHORING DEVICE FOR AN OIL MOP,
Oil Mop, Inc., Metairie, La. (assignee).
H. M. Rhodes.
U.S. Patent No. 3,701,258, 2 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 903, No 5, p 1540, October 31, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Equipment, Abatement, *Pollution abatement, Water pollution control, Water quality control.
Identifiers: *Pulley mop.

A buoyant pulley is provided for use with an endless oil mop. The pulley is mounted on a U-shaped frame. When the pulley is weighted and anchored, the endless mop may be swung about the anchored end to recover oil. The anchor point of the pulley serves as the center of a circle about which the mop may be rotated as the radius. (Sinha-OEIS)
W73-07006

APPARATUS AND METHOD FOR REMOVING OIL PRODUCTS FLOATING ON WATER,
Shell Oil Co., New York. (assignee).
C. Bezemer, H. J. Tadema, and J. H. C. Houbolt.
U.S. Patent No. 3,700,593, 3 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1374, October 24, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution, Water pollution control, Abatement, *Pollution abatement, Water quality control, Equipment, Treatment, *Absorption, Porous media.

Apparatus consists of a porous body which is capable of absorbing oil by capillary suction and a squeezing device to remove the oil for collection. The squeezing device may comprise a pair of rotatable parallel cylinders placed at a distance from each other and leaving a slot-shaped passage for the porous body to be squeezed. Another means to achieve squeezing may comprise a pair of endless belts each rotatable around a series of cylinders and arranged so that a slot-shaped passage of decreasing height is left. The porous body is passed through the passage to be squeezed for the removal of oil. (Sinha-OEIS)
W73-07007

APPARATUS FOR REMOVING FLOATING LIQUIDS FROM THE SURFACE OF A BODY OF WATER,
C. J. Lasko.
U.S. Patent No. 3,700,109, 5 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1261, October 24, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Skimming, Lakes, Rivers, Streams, Oceans, Abatement, *Pollution abatement, Water quality control, Water pollution control, Equipment.

The apparatus consists of a pair of hulls which extend longitudinally between a forward end and an aft end. A basin is supported between the hulls. A skimming edge is placed forward of the basin. Skimmed liquid such as oil passes over the skimming edge and into the basin. The hulls have fore and aft chambers for admitting or expelling water independently into or out of each chamber to select the level and the tilt of the hull relative to the surface of the body of water. (Sinha-OEIS)
W73-07011

OIL SKIMMER,
F. A. Richards.
U.S. Patent No. 3,700,108, 6 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 903, No 4, p 1260, October 24, 1972.

Descriptors: *Patents, *Oil spills, *Skimming, Oil pollution, Separation techniques, Flotsam, Abatement, *Pollution abatement, Gravity, Water quality control, Water pollution control, Equipment.
Identifiers: Gravity separation, *Oil skimmers.

The floatation support is in the form of a pair of elongated floats or pontoons. There is a float bridging framework which defines a liquid impurity component-water separation-holding tank. An impurities-water conveyor is pivotally supported adjacent to the upper-outlet end on the framework. A pair of floating air-jet booms extend forward of the pontoons and sweep floating impurities into the conveyor inlet end. The impurities-water conveyor has flexible paddles. Minimum agitation of the impurities and water is encountered during the charge forming operation at the surface of the water and subsequent transfer along the conveyor. Solid impurities are separated from the oil and water as the latter are admitted to the holding tank in which the oil and water are separated by gravity. (Sinha-OEIS)
W73-07012

METHOD OF WATER PURIFICATION,
For primary bibliographic entry see Field 05F.
W73-07016

A PLANNING MODEL TO PROJECT THE POTENTIAL FOR DESALTING IN THE UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 03A.
W73-07018

YORK RIVER BASIN: PHASE I. ADDENDUM--STATE RIVER BASIN WATER QUALITY PLAN.
Virginia State Water Control Board, Richmond.

Virginia Division of Water Resources, Richmond, Planning Bulletin 265, September 1972. 140 p, 7 plate, 46 tab.

Descriptors: *Water resources development, *Water quality control, *Watershed management, *Water pollution control, *Virginia, Planning, Projections, Water supply, Water demand, Surface waters, Groundwater, Water users, Hydrogeology, Hydrologic data, Data collections, Water yield, Population, Land development.
Identifiers: *York River basin (Va).

From August, 1966 until July 1, 1972 the Virginia Division of Water Resources developed a series of water resources planning volumes (I-IV) for the purpose of guiding water resources development and management in Virginia. On July 1, 1972 the Division of Water Resources was abolished, and all personnel and responsibilities previously maintained by the Division were transferred to the State Water Control Board. All volumes presented after July 1, 1972 will, therefore, be presented as State Water Control Board documents. The Phase I Addendum to the State River Basin Water Quality Plan for the York River Basin contains additional data to supplement information developed in Volumes I through IV. Among the additional data presented in the Addendum are: economic growth parameters for each Planning District Commission in the Basin; maps showing hydrologic planning units which are to be used by planning districts in developing metropolitan/regional water quality plans; minimum waste treatment requirements for the basin; sources of available grant monies; and procedure for the approval of studies, plans, specifications, etc. dealing with water quality control. (Woodard-USGS)
W73-07036

PRACTICAL CONSIDERATIONS FOR ASSESSING THE WASTE ASSIMILATIVE CAPACITY OF ILLINOIS STREAMS,
Illinois State Water Survey, Urbana.
T. A. Butts, V. Kothandaraman, and R. L. Evans.
Circular 110, 1973. 49 p, 15 fig, 8 tab, 46 ref, 3 append.

Descriptors: *Waste assimilative capacity, *Streams, *Illinois, *Biochemical oxygen demand, *Self-purification, Model studies, Data collections, On-site investigations, Sampling, Forecasting, Equations, Streamflow, Water temperature, Dissolved oxygen, Reaeration, Oxygen demand, Water quality control.
Identifiers: Oxygen consumption.

This document was prepared for the practitioner who has the responsibility for developing or approving the design of waste treatment facilities with discharges to Illinois streams. Two basic situations are designated as Case I and Case II. Case I evaluates assimilative capacities on the basis of simulation models. The procudures are applicable when it is necessary to estimate the assimilative capacity of a stream prior to the actual discharge of waste effluents to it. Case II represents a pragmatic approach based upon observed dissolved oxygen or biochemical oxygen demand concentrations at several points along a stream reach. The procedures outlined are particularly useful where the stream is receiving waste water discharges and the effects of the effluents can be evaluated by field investigations. Considerable reliance is placed upon the use of examples in demonstrating the application of formulas, and, where appropriate, actual field data have been used. Procedures for estimating parametric values, which are based upon the experience of field investigations in Illinois, are included. (Woodard-USGS)
W73-07038

CALIFORNIA'S OCEAN RELATED NEEDS, A STUDY TO DETERMINE THE OCEAN RELATED NEEDS AND TO IDENTIFY PROGRAMS TO MEET THE NEEDS,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 06B.
W73-07043

LOW-FLOW INVESTIGATIONS,
Geological Survey, Washington, D.C.
H. C. Riggs.
Available from GPO, Washington, D C 20402 Price - 55 cents. Techniques of Water-Resources Investigations, Book 4, Chapter B1, 1972. 18 p, 18 fig, 3 tab, 9 ref.

Descriptors: *Streamflow, *Low-flow, *Streamflow forecasting, *Low-flow frequency, *Frequency analysis, Methodology, Technology, Flow characteristics, Water pollution control, Waste assimilative capacity, Water quality.

This manual describes U.S. Geological Survey methods of defining low-flow characteristics of streams, shows how certain basin characteristics influence the mean and variability of annual low flows, and recommends procedures for data collection, analysis, and reporting. The adequacy of streamflow to supply requirements for disposal of liquid wastes, municipal or industrial supplies, supplemental irrigation, and maintenance of suitable conditions for fish is commonly evaluated in terms of low-flow characteristics. Certain of these low-flow characteristics also are useful as parameters in regional draft-storage studies, as the basis

for forecasting seasonal low flows, and as indicators of the amount of groundwater flow to the stream. In some States the legal index for pollution control is tied to a low-flow characteristic. (Woodard-USGS)
W73-07052

PRELIMINARY STUDIES ON A BIOLOGICAL FILTER.
Limnetics, Inc., Milwaukee, Wis.

Available from the National Technical Information Service as PB-217 889, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency, Report EPA-R2-73-175 September 1971. 104 p, 27 fig, 47 tab, 5 ref. EPA Grant 16080 FTO.

Descriptors: Sewage effluents, *Agricultural runoff, Water chemistry, Bacteriology, Wisconsin, *Water purification, Biochemical Oxygen Demand, Filtration, *Filters, *Oxygenation, Trickling filters, Water pollution treatment.
Identifiers: *Biological filters, *Stream purification, *B.O.D. reduction, *Jackson Creek (Wis), Lake Delavan (Wis).

A pilot horizontal biological filter similar to a trickling filter was constructed on Jackson Creek near Lake Delavan, Wisconsin. The filter consisted of graded rocks in three sections of four feet wide by two feet deep by six feet long. Water was pumped from Jackson Creek into the filter and water chemistry and bacteriological analyses were undertaken on the influent and effluent from the filter. There was little effect of the filter on the water chemistry or bacteriological content. Preliminary results indicate that substantial B.O.D. reduction occurred when the influent was well oxygenated. (EPA)
W73-07063

PROJECTS IN INDUSTRIAL POLLUTION CONTROL PROGRAM, JULY 1972,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
G. Rey, and G. Keeler.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $4.50 PB-218 160, Microfiche $0.95. Environmental Protection Technology Series, Report EPA-R2-72-120, December 1972. 385 p, 6 fig, 11 tab, EP1.23/2:72-120.

Descriptors: *Industrial water, *Water pollution control, *Water pollution treatment, Water reuse, Waste water treatment, Industries, Water quality.
Identifiers: *Industrial pollution control, *Demonstration projects.

A compilation is presented of the information sheets of the 246 projects initiated since fiscal year 1967 through fiscal year 1972. Each sheet contains the objectives, statistical information, and a brief description of an initiated project. General introductory information on the Federal Industrial Pollution Control Program is also presented to provide perspective on the magnitude of industrial pollution and the research directions that must be pursued in order to develop the technology to adequately control this largest point source of pollution in the United States. During the fiscal year 1972 approximately $5.3 million of federal funds were committed in grants and contracts for projects having total estimated eligible costs of approximately $23 million. The approximately $17.7 million (77 per cent of total commitments) of matching non-federal funds continues to emphasize the urgent need, interest, and desire of American industry to undertake research in cooperation with the federal government to resolve the nation's industrial pollution problems. (See also W70-04045 and W70-02285)
W73-07064

ABATEMENT OF POLLUTION FROM A POULTRY PROCESSING PLANT,
Maine Univ., Orono. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-07094

HYGIENIC VIEWPOINT ON THE ACQUISITION OF DRINKING WATER FROM SURFACE WATERS,
Forschungsinstitut fuer Mikrobiologie und Hygiene, Bad Elster (East Germany).
E. Schulze.
Limnologica. Vol 8, No 2, p 415-420. 1971.
Identifiers: *Potable water, Water quality control, East Germany, Hygiene, *Surface, Waters.

Protective regions for drinking water catchment basins are discussed in the light of East German laws for the protection of drinking water. The recreational use of such basins depends on their size. Swimming is permitted in water volumes greater than 25 million m3. Protected regions extend to 100-200 m beyond the shore.--Copyright 1972, Biological Abstracts, Inc.
W73-07101

ADMINISTRATION, STREAM STANDARDS, AND SURVEYS,
Delaware River Basin Commission, Trenton, N.J.
R. Porges, and S. P. Gross.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1005-1033, June 1972. 324 ref.

Descriptors: *Water quality control, *Water quality standards, *Administration, *Reviews, *Water management (Applied), Surveys, Data collections, River basins, Water pollution control, Chemical properties, Physical properties, Heavy metals, Chemical oxygen demand, Biochemical oxygen demand, Chemical analysis, Water analysis, Dissolved oxygen, Bacteria, Freshwater, Rivers, Lakes, Streams, Monitoring, Federal Water Pollution Control Act.

An extensive literature review has been organized on water quality administration and standards, criteria, control, data collections, and surveys. (Holoman-Battelle)
W73-07105

AGRICULTURAL WASTES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05B.
W73-07107

MECHANICAL AND PHYSICAL ASPECTS OF WATER POLLUTION BY OIL SPILLAGE,
Battelle-Northwest, Richland, Wash.
C. H. Henager.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1123-1128, June 1972. 44 ref.

Descriptors: *Oil spills, *Water pollution sources, *Reviews, *Mechanical equipment, *Methodology, Oil pollution, SorpAqion, Biodegradation, Water treatment, Hydraulic machinery, Computer models, Physical properties, Oil-water interfaces, Quatic environment, Sea water, Biochemical oxygen demand, Size, Photography.
Identifiers: *Oil removal, Chemical removal, Chemical treatment, Oil recovery, Skimmers, Fuel oil, Bunker C oil, Oil booms, Adsorbents, Dispersants, Crude oil, Microwave radiometry, Combustion agents.

A literature review covers the sources of oil pollution and the equipment and methods being utilized in cleaning up oil spills. Those cleanup devices and methods of recent development and use include mechanical skimmers, herding devices, improved booms, combustion promoters, biological degradation, sorption, and chemical booms. The physical behavior of oil on water is also reviewed. (Holoman-Battelle)
W73-07108

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

THE MOVEMENT AND QUALITY OF COASTAL WATERS: A REVIEW OF MODELS RELEVANT TO LONG ISLAND, NEW YORK,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 05B.
W73-06602

ANALOG SIMULATION OF GROUND-WATER DEVELOPMENT OF THE SAGINAW FORMATION, LANSING METROPOLITAN AREA, MICHIGAN,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 04B.
W73-06824

ESTIMATING TRADE-OFFS BETWEEN SEDIMENTATION AND FARM INCOME,
Illinois University, Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 04A.
W73-07025

6B. Evaluation Process

AN ANALYSIS OF ATTITUDES AND OPINIONS OF ST. JOE RIVER BASIN LANDOWNERS TOWARDS WILD AND SCENIC RIVERS,
Idaho Univ., Moscow. Water Resources Research Inst.
K. A. Christophersen.
Available from the National Technical Information Service as PB-217 860, $3.00 in paper copy, $0.95 in microfiche. Scenic Rivers Study, Report no. 2, December 1972, 74 p, 1 fig, 17 tab. OWRR-C-3342 (3718) (1).

Descriptors: *Attitudes, Land use, *Wild rivers, Wild River Act, Benefits, *Idaho.
Identifiers: *St. Joe River.

Information was obtained from St. Joe River landowners regarding their attitudes and opinions of the proposed inclusion of the river in the National Wild and Scenic Rivers System: Questionnaires were mailed to 327 landowners whose properties are located within the land area which could be affected by Wild and Scenic Rivers restrictions. A total of 54.4% of the landowners responded to the questionnaire. Approximately 76% of the affected land area downstream from Avery is privately owned, whereas the affected land area upstream from Avery is in national forest. Results of the survey revealed that 68.8% of the resident landowners were strongly opposed to classifying the lower segment of the St. Joe River from Avery to the conclusion of the river at Beedle Point at Coeur d'Alene Lake. Forty-three percent of the absentee landowners (Not residing in the St. Joe River Basin) were also strongly opposed to classifying this segment of the river. In contrast, the majority of landowners were either strongly or mildly in favor of including the entire river upstream from Avery in the National Wild and Scenic Rivers System. Opposition to classifying the lower St. Joe River was based on landowners' perceptions of the degree to which Wild and Scenic River restrictions would affect: (1) The free flow of traffic through the river Corridor, (2) property values and taxes, (3) personal income, (4) area economy, and (5) continued recreational use (or abuse) of private property.
W73-06503

A STUDY OF THE RELEVANCE OF SELECTED ECOLOGICAL FACTORS RELATED TO WATER RESOURCES AND THE SOCIAL ORGANIZATION OF FISHING VILLAGES IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
F. G. Blay.
Available from the National Technical Information Service as PB-217 863, $3.00 in paper copy, $0.95 in microfiche. Completion report, June, 1972. 88 p, 19 tab, 22 ref, 1 append. OWRR A-009-PR (1).

Descriptors: *Fishing, *Occupations, Productivity, Planning, Income, Education, Fertility, Water pollution, Surveys, Ecology, *Puerto Rico, Social aspects, Environmental effects.
Identifiers: *Fishermen.

If government programs and policies for helping fishermen attain greater productivity are to be successful, it will be necessary to understand the behavior of the fishermen. To further this objective, the fishing industry in the four main fishing villages in southwest Puerto Rico was studied. Specific objectives of the study included: (1) discovering the differences in such factors as level of living, fertility, education, religious affiliation, and age between fishermen and people in other occupations and between the more urbanized areas and the rural areas; (2) determining the relationship between such variables as education and fertility, and occupation and fertility; and (3) evaluating the aspirations and job satisfaction of fishermen. Data for the study were gathered through personal interviews, observations, and official information. Data on population fertility; religion; education; age distribution and migration; and job satisfaction, aspirations, and occupational mobility are presented. Surprisingly, fishermen who pursued their trade in highly polluted waters had about the same job aspiration and satisfaction as fishermen who lived near and worked in less polluted waters. (Settle-Wisconsin)
W73-06506

DEVELOPMENT OF MODEL FOR PRICING WATER IN PROVIDING A BASIS FOR ALLOCATING WATER AMONG COMPETING USES,
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 05G.
W73-06507

RESEARCH ON DECISION MAKING AND RELATED MANAGERIAL ASPECTS OF BRITISH WATER RESOURCES PROGRAMS - EMERGING FORCES IN BRITISH WATER RESOURCES DEVELOPMENT,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 06E.
W73-06514

ALTERNATIVE ECONOMIC EVALUATION PROCEDURES AND WATER DEVELOPMENT PROJECTS: THE MULTIPLE OBJECTIVE PROBLEM,
Oregon State Univ., Corvallis. Dept. of Agricultural Economics.
G. D. Lynne, E. N. Castle, and C. Gibbs.
Available from the National Technical Information Service as PB-217 873, $3.75 in paper copy, $0.95 in microfiche. Completion Report, February, 1, 1973. 40 p, 4 fig, 2 tab, 54 ref. OWRR B-022-ORE (1).

Descriptors: Economics, Evaluation, *Multiple-purpose projects, Values, Decision making, *Cost allocation, Alternative planning, *Alternative water use, Legislation, *Social values, Legal aspects.
Identifiers: *Multiple objective functions.

The relationship among varying social objectives is of paramaount importance with regard to evaluation and cost allocation processes in water resource use, development, and management projects. This study examines the philosophical and ethical base underlying proposed procedures for dealing with the multiple objective problem. The specific objectives of the study were (1) to account for the evolution of the multiple objective function, (2) to identify the relationships among objectives in water resource development, and (3) to identify the effect of relationships among objectives on the ultimate value of the tradeoff ratio as well as the calculation process. Several legislative documents relating to public intervention in water resource development were reviewed in an attempt at accounting for the evolution of the multiple objective function, and at identifying the relationships among objectives. It was concluded that the multiple objective function was prevalent even in early legislation. Only the elements of the function have changed over time. The relationships among objectives, however, have not been made explicit.
W73-06516

WASTE HEAT UTILIZATION IN WASTE-WATER TREATMENT,
URS Research Co., San Mateo, Calif. Environmental Systems Div.
For primary bibliographic entry see Field 05D.
W73-06524

ECOLOGICAL IMPACT OF SURFACE WATER IMPOUNDMENTS IN THE GREAT PLAINS AREA,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 06G.
W73-06528

WETLANDS ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
R. Green.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, February, 1972, 80 p, 4 fig, 6 tab, 96 ref, 4 append. NSF GH - 63.

Descriptors: *Wetlands, *Comprehensive planning, *Ecology, *Urbanization, *New York recreation, Natural resources, Environmental impact, Land reclamation, Ecology.
Identifiers: *Long Island, Wetland preservation, Wetland enhancement, Implementation.

The problem considered is how to recognize, preserve, and enhance the usefulness of wetlands in Nassau and Suffolk Counties for ecological and for human purposes. The state of the art is assessed, research and data needs are identified, and guidelines are presented. Wetlands are of concern on Long Island because of two competing facts. First, Long Island is adjacent to the country's largest concentration of people. This generates large and growing pressures for the use of natural resources in many differing ways: housing, beach use, and recreational boating. Second, the Long Island marine environment is a highly productive, important natural resource which has been increasingly changed, enhanced, and destroyed. These two facets in one area bring about conflicting pressures for preservation and use. This conflict is readily apparent in the area's coastal wetlands. The analysis consists of : examining wetland relationships, to include wetland characteristics, natural functions, and man's uses; examining wetland changes caused by nature and, especially by man, to include a consideration of wetland losses in the past, present and probable future; identifying major wetland problems; and examining steps in the comprehensive wetlands management to include a temporary moratorium, a controlled inventory, an evaluation of qualitative features, a listing of preservation enhancement techniques, and the preparation and implementation of a comprehensive wetlands plan. (Davis-Chicago)
W73-06596

FOURTEEN SELECTED MARINE RESOURCE PROBLEMS OF LONG ISLAND, NEW YORK: DESCRIPTIVE EVALUATIONS,
Travelers Research Corp., Hartford, Conn.
F. A. Smith, L. Ortolano, R. M. Davis, and R. O. Brush.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, January, 1970, 128 p, 3 fig, 6 tab, 191 ref. NSF GH - 63.

Descriptors: *Environmental problems, *Coasts, *Management, *New York sport fishing, Recreation, Marine plants, Wetlands, Shellfish, Waste water disposal, Industrial wastes, Farm wastes, Recreation wastes, Solid wastes, Oil spills, Thermal pollution, Pesticide residues, Dredging, Coastal engineering, Shore protection.
Identifiers: *Long Island, *Marine resources, *Coastal resources, Eelgrass, Dredging spoil disposal.

A series of fourteen essays is presented, each dealing with a particular marine resource problem previously identified as a cause for concern by residents of Long Island. The identification and evaluation of discretely defined 'problems' of the coastal marine environment has constituteda fundamental phase of a longer term research program designed ultimately to provide knowledge, information and methods for more comprehensive management of coastal resources. The fourteen problem areas include: sport and commercial finfish, shellfish, eelgrass, wetland destruction, domestic and industrial wastewater diaposal, wastewater from vessels, wastewater from duck farms, solid waste disposal, thermal pollution, oil spill pollution, chemical pesticides, dredging and dredging-spoil disposal, shoreline recreation, and coast stabilization and protection. (Davis-Chicago)
W73-06597

THE DESIGN OF A MANAGEMENT INFORMATION SYSTEM FOR COASTAL RESOURCES PLANNING,
Center for the Environment and Man, Inc., Hartford, Conn.
R. H. Ellis, P. B. Cheney, J. T. Ball, and E. R. Sweeton.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, February, 1972, 113 p, 31 fig, 5 tab, 10 ref. NSF GH-63.

Descriptors: *Planning, *Management, *Data collection, *Data processing, *Information exchange, *Coastal engineering, Systems analysis, New York.
Identifiers: *Management information system, *Coastal resources, *Long Island, Resource management.

The objective is to present a design blueprint for the development of a coastal zone management information system. This system has been developed as one of several tools to be utilized in dealing with the complexities of resource management. Coastal zone planning and resource management require an understanding of the complex milieu of interactions and activities taking place throughout this region. Man is beginning to recognize that the old methods of dealing with individual issues and problems as single fragments of whole environmental systems frequently have led to counterintuitive reactions which have had an overall deleterious effect. Part of the solution to this problem is improved information on the total system. General and specific characteristics, structure and function of the total system and its

components, and examples of system application are described. A suggested sequence and time schedule for system development and operational implementatica is also discussed. The system presented was specifically designed for use on Long Island based on the planning and decision problems pertaining to that region. (Davis-Chicago)
W73-06598

DREDGING ON LONG ISLAND,
Center for The Environment and Man, Inc., Hartford, Conn.
R. M. Dowd.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, February, 1972, 43 p, 6 tab, 4 fig, 18 ref, 1 append. NOAA GH-63.

Descriptors: *Dredging, *Environmental effects, *Decision making, *Management, *New York, Social aspects, Cost analysis, Costs, Benefits, Evaluation, Social values.
Identifiers: *Long Island, *Policy, Marine resources, Social motivation.

The problem considered is how to satisfy essential dredging requirements on Long Island and do it in a socially acceptable, environmentally safe way that will not destroy existing marine resources in the area. The problem is introduced and analyzed in light of the social framework in which a dredging project takes place. The environmental impact of dredging is seen in terms of social motivation and affected social activities as well as its impact upon living and non-living resources. It is suggested that decisions made about dredging must include these social factors when evaluating and judging the benefits and costs. Issues of policy and decision frameworks are offered, rather than a series of suggestions about each individual decision. As a result, this analysis focuses upon the major types of effects and tries to avoid the smaller details. The problem was analyzed in five steps: (1) motivation consideration of the variety of motives that leas to dredging, (2) process examination of the technical process itself; (3) changes - ascertaining the changed environmental conditions which result from the dredging process; (4) impact - evaluation of the impact of those changed conditions on human activities and values; and (5) management -examination of the system presently employed in making dredging decisions and the implications of this system. (Davis-Chicago)
W73-06599

COAST STABILIZATION AND PROTECTION ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
F. L. Bartholomew, and W. V. McGuinness, Jr.
Prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, February, 1972, 48 p, 5 fig, 5 tab, 73 ref. NOAA GH-63.

Descriptors: *Shore protection, *Comprehensive planning, *Shores, *Coastal engineering, Alternative planning, Project planning, Environmental impact, Economic feasibility, Technical feasibility, Social aspects, New York.
Identifiers: *Long Island, *Shore processes, *Coastal stabilization, Shore usage.

The problem considered in this analysis is defined as 'how to stabilize and protect the coast of Long Island in an economically, socially and environmentally acceptable way for now and for the future.' It will involve an evaluation of what shoreline conditions are desirable, what can feasibly be done to promote these desirable conditions, and what undesirable secondary or side effects must be avoided or minimized. The perspective for ascertaining 'desirable condition' and 'undesirable secondary effects' is that of comprehensive planning which explicitly takes into account the desires of all major users of the coastal zone. A seven part general approach to the problem is outlined: (1) understand shore processes, (2) observe the usage of the shore, (3) observe the condition of the shore, (4) determine where usage requires preservation or change of the present shore conditions, (5) examine alternative course of action, (6) examine the external consequences, and (6) set up a program of compatible projects. (Davis-Chicago)
W73-06600

QUALITY STANDARDS FOR THE COASTAL WATERS OF LONG ISLAND, NEW YORK,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 05G.
W73-06601

MUSKEGON LAKE STUDY, A PRELIMINARY POLICY STATEMENT.
West Michigan Shoreline Regional Planning Commission, Muskegon.

September 30, 1971, 19 p, 1 fig, 1 ref.

Descriptors: *Urbanization, *Management, *Water policy, Community development, Regional development, Water pollution control, Economic impact, Recreation, Transportation, Programs, Project planning, Land forming, Landfills, *Michigan.
Identifiers: *Muskegon Lake, *Muskegon (Mich), Industrial development.

This policy statement examines some of the problems involved in the management of a large lake in the middle of an urbanized area. The current status of Muskegon Lake is outlined in terms of development pressures and problems, past policies, ongoing efforts to deal with policy problems, and improvement programs. Policy directions as they are currently evolving are discussed emphasizing the environmental improvement of water pollution and unregulated, unplanned filling in of the lake; and compatible economic development, stressing recreational development, transportation opportunities and possible industrial development. Goals are outlined for a thorough lakefront study. An interim policy is also outlined describing programs which should be undertaken immediately. (Davis-Chicago)
W73-06605

TEXOMA REGION AREAWIDE WATER PLAN PHASE II.
Freese, Nichols and Endress, Fort Worth, Tex.

Report prepared for Texoma Regional Planning Commission, Denison, Texas, December 1971, 140 p, 23 fig, 34 tab, 3 ref, 5 append. HUD-CPA-TX-06-16-1003.

Descriptors: *Water supply, *Comprehensive planning, *Water resources development, *Water supply development, Urbanization, Water demand, Water utilization, Evaluation, Cost analysis, Alternative planning, *Texas.
Identifiers: *Texoma region, Potential water supply systems.

The purpose was to provide a comprehensive plan for the optimum development of available water resources within the Texoma region of north central Texas and for the utilization of these water resources to satisfy the urban water supply requirements. Methods are evaluated and a program is recommended for the utilization of the available water resources to satisfy the future water demands. Analyses of potential water supply systems, cost estimates of water supply systems, and individual conclusions and recommendations regarding future water supply development for each of the urban areas within the region are included. (Davis-Chicago)
W73-06607

INTEGRATED WATER SUPPLY AND WASTE WATER DISPOSAL ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
W. V. McGuinness, Jr., and R. Pitchai.
Report prepared for the Regional Marine Resources Council, Nassau-Suffolk Regional Planning Board, February 1972, 181 p, 22 fig, 25 tab, 63 ref, 6 append. NOAA GH-63.

Descriptors: *Water supply, *Waste disposal, *Cost analysis, *Water supply development, *Waste water disposal, Water demand, Social aspects, Economic impact, Water quality, Projection, Alternative planning, Institutional constraints, *New York.
Identifiers: *Long Island.

The purpose is to examine the basic problem of how to satisfy the total requirements for water supply and waste water disposal on Long Island in an economically, socially and environmentally acceptable way for now and for the future and to examine the principal considerations involved, inadequacies in current knowledge, and the choices available together with their broad implications. The approach developed consists of: examining the natural hydrologic system, man's water supply and waste water system, and the combined man-influenced system in terms of water quantity and water quality; examining projections of future water supply and waste water disposal requirements; examining the potential effects of meeting these requirements on man and the natural environment; developing and analyzing numerous alternative solutions in terms of costs, and broad geological, health, ecological, and institutional considerations; and identifying those solutions which merit the most intensive consideration. (Davis-Chicago)
W73-06608

THE WATER POLLUTION HAZARD IN THE IOWA RIVER BASIN, IOWA: A DESCRIPTIVE STUDY OF ATTITUDES AND OPINIONS,
Iowa Univ., Iowa City. Dept. of Geography.
For primary bibliographic entry see Field 05G.
W73-06609

PLANNING NATURAL RESOURCE DEVELOPMENT, AN INTRODUCTORY GUIDE,
Economic Research Service, Washington, D.C.
G. A. Pavelis.
Agriculture Handbook No 431, May 1972, 30 p, 4 fig, 7 tab, 34 ref, append.

Descriptors: *Planning, *Decision making, *Natural resources, *Resource development, Programs, Multiple purpose, Technical feasibility, Formulation, Economic impact, Multiple-purpose projects.
Identifiers: *Resource planning.

This guide describes and illustrates principles for making rational decisions on the scope, content, and scale of natural resource development programs. Its five main parts correspond to distinguishable phases of actual resource planning. First, some concepts and procedures for selecting feasible components of development programs are outlined. Second, a suggested criterion for identifying an initial array of feasible project proposals is presented. Third, methods are explained for formulating preliminary single-purpose or multipurpose programs. Fourth, the preliminary programs are reexamined for further possibilities of integrating program purposes. Fifth, it is shown how a recommended 'final' program might influence the income and other economic accounts of an economic system. The guide is introductory in nature, although some terminology and examples are

technical when accuracy requires it. Its main purpose is to help public officials and others who do no actual planning, but who make important decisions regarding projects, better understand and judge the comparative merits of development programs. (Davis-Chicago)
W73-06610

THE PLANNING SYNDROME IN WESTERN CULTURE,
Yale Univ., New Haven, Conn.
C. Tunnard.
The Annals of the American Academy of Political and Social Science, p 95-103, (1972), 15 ref.

Descriptors: *Planning, *Methodology, *Social aspects, *City planning, Aesthetics, Social values, Urbanization.
Identifiers: Planning process, Social planning, Planning techniques.

The planning function embraces various postures and skills deriving not only from the natural and social sciences, but from humanities, whence the artistic and cultural aspects lend color to the operation. One of its products, the city, has the longest history and has at times achieved a congenial and even inspiring setting for human affairs. In analysis, the components of the planning process emerge with Renaissance theory, but develop with the growth of nations and cities, colonization, and the birth of the great metropolis. New concepts bring changes in urbanized societies, but the pace of improvement slows as problems proliferate. The lack of social planning at last becomes apparent and, together with the realization that overpopulation and the side effects of industrial development threaten the continuation of life on earth, demands the view of the environment transcending the economic-physical approach of routine planning technology. (Davis-Chicago)
W73-06615

WATER QUALITY MANAGEMENT IN THE SALT CREEK BASIN INCLUDING THE LINCOLN METROPOLITAN AREA.
Nebraska Soil and Water Conservation Commission, Lincoln. Salt Valley Watershed District.
For primary bibliographic entry see Field 05G.
W73-06617

COMPREHENSIVE WATER AND SEWERAGE PLAN FOR DUKES COUNTY (MASSACHUSETTS).
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 05D.
W73-06618

WATER AND SEWER PLAN.
Erie County Metropolitan Planning Commission, Pa.
For primary bibliographic entry see Field 05D.
W73-06619

1972 OBERS PROJECTIONS ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 1: CONCEPTS, METHODOLOGY, AND SUMMARY DATA.
Water Resources Council, Washington, D.C.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $15.50 per 5 vol. set. September 1972, 109 p, 4 fig, 53 tab, 14 ref, 5 append.

Descriptors: *Statistics, Statistical methods, *Projections, *Future planning (Projected), Forecasting, Methodology, Data collections, *Economy prediction, *Regional economics, Planning, Land use, *Census, Human population, United States, Employment, Industries, Manpower, Income.

This report presents projections of economic activity for the Nation, functional economic areas, water resources regions and subareas and the 50 States by decade intervals from 1980 to 2020. Included are projections of population, personal income, employment earnings of persons and output, with the last three items shown by industry. Also included are projections of land use by broad categories for the same period. The historical information from which the projections were derived is included in essentially the same geographic and industrial detail as the projections. The report represents a major output of a program of economic measurement, analysis and projection conducted by the Bureau of Economic Analysis (BEA), U.S. Department of Agriculture with assistance from the Forest Service. The objectives of this phase of the OBERS program are the development and maintenance of (1) a regional economic information system with provisions for rapid and flexible data retrieval; and (2) near term (1980-1990) mid term (2000) and far term (2020) projections of population, economic activity and land use for the Nation and its geographic subdivision. Textual analysis includes projection of both national and regional economic activity accompanied by summary tables. (See also W73-06621 thru W73-06624)
W73-06620

1972 OBERS PROJECTIONS ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 2: BEA ECONOMIC AREAS.
Water Resources Council, Washington, D.C.

September 1972, 351 p, 1 fig, 5 tab.

Descriptors: *Statistics, Statistical methods, *Projections, *Future planning (Projected), Forecasting, Methodology, Data collections, *Economic prediction, *Regional economics, Planning, Land use, *Census, Human population, United States, Employment, Industries, Manpower, Income.

Volume 2 presents historical and projected data for the 173 BEA economic areas. The 348 pages of tables in this volume include two tables for the United States and for each of the BEA economic areas. Table 1 includes data on population, personal income, total employment, earnings of persons by 37 industry groups, per capita income, earnings per worker and employment/population ratios. Table 2 includes data on population, employment by 33 industry groups and employment/population ratios. Each table has an area identification in the upper left corner which includes the area name and number. A list of the specific industry groups for which projections have been made together with their Standard Industrial Classification Code is also presented. Brief descriptions of the individual industries taken from the SIC Manual of 1967 are included in an appendix. These last two items are repeated in volumes 3, 4 and 5.
W73-06621

1972 OBERS PROJECTIONS, ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 3: WATER RESOURCES REGIONS, 1-8.
Water Resources Council, Washington, D.C.

September 1972, 225 p, 1 fig, 14 tab.

Descriptors: *Statistics, Statistical methods, *Projections, *Future planning (Projected), Forecasting, Methodology, Data collections, *Economic prediction, *Regional economics, Planning, Land use, *Census, Human population, United States, Employment, Industries, Manpower, Income.

Volumes 3 and 4 present historical and projected data for the water resources regions and subareas--Volume 3 covering the regions and subareas located in the East. The delineation of the country into water resources regions and subareas is shown on a map. The 222 pages of tables in this volume include 6 tables for the United States, 4 tables for each of the 8 water resources regions located in the eastern United States and 3 tables for each of the 92 subareas in the 8 regions. Each table has an area identification which includes the area name and number. United States Table 1 includes data on population, personal income, total employment, earnings by 37 industry groups, per capita income, earnings per worker and employment/population ratios. United States Table 2 includes population, employment by 33 industry groups and employment/population ratios. United States Table 3 presents indexes of production for selected industry groups. United States Table 4 includes data on agricultural and forestry production by commodity groups, United States Table 5 includes data on value of agricultural production by commodity group and United States Table 6 includes data on land use. Table 1 for both the water resources regions and subareas correstponds to United States Table 1 except earnings are presented for only 28 industry groups. Table 2 for the regions and the subareas presents indexes of production for selected industry groups and corresponds to United States Table 3. Water Resources Region Tables 3 and 4 present data on agricultural and forestry production and value of agricultural production respectively and correspond to United States Tables 4 and 5. Water Resources Subarea Table 3 presents summary data on the value of crop and livestock production and the production of roundwood. (See also W73-06620)
W73-06622

1972 OBERS PROJECTIONS, ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 4: WATER RESOURCES REGIONS, 9-20.
Water Resources Council, Washington, D. C.

September 1972, 283 p, 1 fig, 14 tab.

Descriptors: *Statistics, *Projections, *Future planning (Projected), *Economic prediction, *Regional economics, *Census, Statistical methods, Forecasting, Methodology, Data collections, Planning, Land use, Human population, United States, Employment, Industries, Manpower, Income.

Volumes 3 and 4 present historical and projected data for the water resources regions and subareas--Volume 4 covering the regions and subareas located in the West. The delineation of the country into water resources regions and subareas is shown on a map. The 276 pages of tables in this volume include 6 tables for the United States, 4 tables for each of the 10 regions in the western coterminous United States, 2 tables each for Alaska and Hawaii and 3 tables for each of the 113 subareas in the 10 regions in the western coterminous States. Correlation of United States Tables and Water Resources Region Tables are the same as those appearing in Volume 3. (See also W73-06620)
W73-06623

1972 OBERS PROJECTIONS, ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 5 STATES.
Water Resources Council, Washington, D.C.

September 1972. 211 p, 13 tab.

Descriptors: *Statistics, *Projections, *Future planning (Projected), *Economic prediction, *Regional economics, *Census, Statistical methods, Forecasting, Methodology, Data collections, Planning, Land use, Human population, United States, Employment, Industries, Manpower, Income.

Volume 5 presents the historical and projected data for the individual States. The 202 pages of tables in this volume include 6 tables for the United States; 6 tables each for the 17 western coter-

minous States, Arkansas, Mississippi and Louisiana; two tables each for Alaska and Hawaii, and 5 tables for each of the 27 remaining eastern States. United States Tables are the same as those appearing in volumes 3 and 4. Table 1 for each State corresponds to United States Table 1 except earnings are presented for only 28 industry groups. Table 2 for each State presents indexes of production for selected industry groups and corresponds to United States Table 3. State Tables 3 and 4 present data on agricultural and forestry production and value of agricultural production respectively and correspond to United States Tables 4 and 5. State Table 5 presents data on land use and corresponds to United States Table 6 and State Table 6 which is presented for 21 States includes data on the use of irrigated land. (See also W73-06620)
W73-06624

U.S. DEEPWATER PORT STUDY--SUMMARY AND CONCLUSIONS.
Robert R. Nathan Associates, Inc, Washington, DC.
For primary bibliographic entry see Field 08A.
W73-06711

U.S. DEEPWATER PORT STUDY--COMMODITY STUDIES AND PROJECTIONS.
Nathan (Robert R.) Associates, Inc., Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-06712

U.S. DEEPWATER PORT STUDY--TRANSPORT AND BENEFIT-COST RELATIONSHIPS,
Nathan (Robert R.) Associates, Inc., Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-06714

THE GRASS ROOTS AND WATER RESOURCES MANAGEMENT.
Washington State Water Research Center, Pullman.
For primary bibliographic entry see Field 06E.
W73-06851

A CASE STUDY: PUGET SOUND AND ADJACENT WATERS.
For primary bibliographic entry see Field 06E.
W73-06852

PUBLIC INVOLVEMENT PROGRAMS OF FEDERAL AGENCIES.
For primary bibliographic entry see Field 06E.
W73-06853

PUBLIC INVOLVEMENT PROGRAMS OF FEDERAL AGENCIES: WILD, SCENIC, AND RECREATIONAL RIVERS PROGRAM.
For primary bibliographic entry see Field 06E.
W73-06854

THE ROGUE RIVER BASIN STORY,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 06E.
W73-06855

LESSONS IN PUBLIC EDUCATION,
Washington State Univ., Pullman. Cooperative Extension Service.
For primary bibliographic entry see Field 06E.
W73-06856

THE ROLE OF THE CONCERNED CITIZEN,
Washington State Soil and Water Conservation Committee, Olympia.
For primary bibliographic entry see Field 06E.
W73-06857

PUBLIC WORKSHOPS ON THE PUGET SOUND AND ADJACENT WATERS STUDY: AN EVALUATION,
A. Widditsch.
Army Engineer Institute for Water Resources Report 72-2, June 1972. 135 p, 2 fig, 7 append. DACW 31-71-C-0042.

Descriptors: *Water resources development, *Planning, *Public access, Evaluation, River basin development, Decision making, Social aspects, Methodology, *Washington.
Identifiers: *Workshops, *Public participation, *Puget Sound (Wash).

Public demands for a greater role in decisions concerning the use of the nation's natural resources have led planners to adopt various methods for public participation in the water resources planning process. The Puget Sound and Adjacent Waters Study in the State of Washington used as the public participation mechanisms a series of public workshops to enable public review of the planning documents and to give local interests an opportunity to recommend changes in the preliminary findings. An evaluation of this workshop mechanism suggests that workshops offer several advantages. Workshops provide citizens an opportunity to review and criticize the study; they allow the study's plans and ideas to reach more people than usual; they help educate citizens about techniques of working with or through government agencies; and they help educate the planners as to the necessity for and the possibilities of public involvement. The workshops encountered numerous difficulties which future workshops could avoid. Workshop participants failed to receive adequate numbers of important study-related documents; certain citizen groups were under-represented; meeting times and places were not adequately advertised; and the meetings were too informal and unstructured. Several recommendations for effective public participation are given. (Settle-Wisconsin)
W73-06861

PRELIMINARY WATER PLAN FOR THE BALTIMORE SECTION,
Regional Planning Council, Baltimore, Md.
For primary bibliographic entry see Field 03D.
W73-06895

UPPER TRINITY RIVER BASIN COMPREHENSIVE SEWERAGE PLAN.
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 05D.
W73-06896

WATER AND SEWER PLAN AND PROGRAM, SANTEE-WATEREE REGIONAL PLANNING COUNCIL.

Santee-Wateree Regional Planning Council, Sumter, South Carolina, May 1972. 121 p, 23 fig, 13 tab, 15 ref. HUD No. SCP-50.

Descriptors: *Planning, *Sewerage, *Water supply development, *South Carolina, Forecasting, Water demand, Water pollution control, Waste water treatment, Municipal wastes, Municipal water, Sewers, Programs.

A study was made of the water and sewer facilities available in the four-county area in central South Carolina served by the Santee-Wateree Regional Planning Council. Plans were prepared to the year 2000 for future development of water and sewer services in this area consisting of Clarendon, Kershaw, Lee and Sumter counties. Covering an area of 2,458 square miles, and with a 1970 population of 157,500, the population in the year 2000 is projected to be 205,400 primarily through urban growth. This growth is projected to cause water supply capacity deficiencies of about 91 mgd by the year 2000. A total deficiency of 43 mgd is expected in sewage treatment capacity in addition to deficiencies attributed to presently operating facilities in meeting future standards. There are few systems in existence now, as evidenced by only 23 water supply systems and 9 public waste water treatment systems in the entire four-county area. It is recommended that regional development accompanied by reorganization of local facilities be implemented to meet the future needs of the area. County water authorities are recommended to be established by 1975 and a regional water and sewer authority is recommended with a suggestion that it be in full operation by 1980. (Poertner)
W73-06897

WATER SUPPLY AND SOLID WASTE FACILITIES, ALLEN COUNTY, OHIO.
Jones and Henry Engineers, Ltd., Toledo, Ohio.

Report prepared for the Lima-Allen County Regional Planning Commission, Lima, Ohio, August 1970. 64 p, 14 fig, 33 tab, 5 append.

Descriptors: *Water supply, *Regional planning, Water sources, Groundwater, Surface waters, Water demand, Land use, Projections, Facilities, Water treatment, Water softening, Solid wastes, Management, *Ohio.
Identifiers: *Lima (Ohio), Drinking water standards, Fire fighting demands, Regional solid waste management.

Ground and surface waters are the major local source of water in the Lima-Allen County Planning Region. These two sources are adequate to satisfy the demands of the region until the year 2010 under the assumed land use projections. The quality of the two sources is inadequate to comply with Ohio's drinking water standards. Treatment is needed to achieve these standards and such treatment should include softening. Transmission mains in most communities are adequate for the time period indicated above. Storage in some service areas is less than required to supply peak hour or fire demands. Solid waste management in the region is nearing a critical period as there has been no management authority created subsequent to recent state legislation regulating refuse disposal problems. Success in dealing with solid waste problems is dependent upon a regional solid waste program, adopted and administered by the County. (Davis-Chicago)
W73-06898

WATER QUALITY MANAGEMENT PLAN FOR THE KANSAS CITY METROPOLITAN REGION, PHASE I.
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05G.
W73-06901

WATER SUPPLY AND SEWERAGE FOR THE WINDHAM REGION, PART I: BACKGROUND DISCUSSION.
Windham Regional Planning Agency, Willimantic, Conn.

May 1972. 30 p, 2 fig, 3 tab. CPA-CT-01 - 26 - 1003.

Descriptors: *Water supply, *Sewerage, *Regional development, *Planning, Public utilities, Water policy, Water resources, Water demand, *Connecticut.
Identifiers: *Windham region.

Regional and local water and sewerage studies are summarized. A water and sewer plan is contained in a separate document, 'Water Supply and Sewerage for the Windham Region - Part 2: Regional Plan.' The region has existing public water and sewer service in the city of Willimantic and institutional systems serving the University of Connecticut and Mansfield Training School. Regional policies recommend the extension of these facilities to areas within the three-town center of the region. Water resources within the region are sufficient to meet forseeable needs and receiving streams are adequate to provide the anticipated population growth. (See also W73-06903) (Davis-Chicago)
W73-06902

WATER SUPPLY AND SEWERAGE FOR THE WINDHAM REGION, PART 2: REGIONAL PLAN.
Windham Regional Planning Agency, Willimantic, Conn.

May 1972. 19 p, 2 fig. CPA - CT - 01 - 26 - 1003.

Descriptors: *Water supply, *Sewerage, *Urbanization, *Regional development, *Planning, *Land use, Public utilities, Regional analysis, *Connecticut.
Identifiers: *Windham region (Connecticut).

A plan is presented that would provide water and sewer services for the Windham Region, Connecticut at saturation development based on previously-adopted land use policies. Two sewer systems would serve the central portion of the region. The same area would be served by a water system that could begin as three separate systems but would eventually merge into a single system. Several water development policies are identified: (1) The plan does not require, nor necessarily recommend, that all areas indicated as being within the service area be provided with water and sewer facilities when they become available in the vicinity; (2) New community water systems which are allowed within the designated service area should be constructed according to standards and criteria that will allow them to be integrated into the public system when it is extended to the area; (3) Small community sewerage systems will be allowed insofar as the regional plan is concerned but only in areas that are slated for eventual sewering and only if the operation of such systems is to be carried out by a public agency. (See also W73-06902) (Davis-Chicago)
W73-06903

HYDROLOGY AND WATER RESOURCES OF THE LAKE TAHOE REGION, A GUIDE FOR PLANNING.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.

June 1971. 26 p, 1 fig, 3 tab, 3 map, 10 ref.

Descriptors: *Water resources, *Hydrology, *Planning, *Urbanization, *Land development, Flood plain zoning, Storm runoff, Zoning, Land use, Land management, Short-term planning, Long-term planning, Climatology, *California, *Nevada.
Identifiers: *Lake Tahoe, Shoreline erosion.

Most of the land development activity in the Lake Tahoe Region reveals either lack of awareness of important aspects of the hydrology of the area or else deliberate ignoring of them. Only recently has zoning of floodplain areas been recognized as a need. Local governmental agencies have not yet developed realistic systems for disposal of storm drainage; present practice is simply either to deliver overland flow from storms directly to Lake Tahoe or else to the nearest stream and without any treatment to reduce its potential for water pollution. No one in authority has recognized that the effect of increased runoff from urban areas into the natural drainage systems is bad. However, some attention is being devoted to on-site problems in developed areas. Several guides to planning are presented. (1) The damage to man's installed facilities caused by such natural events as storms and floods, avalanches, and landslides can be held to a minimum by delineating the areas where they have occurred and zoning to avoid them. (2) The adverse effects of increased runoff caused by changes in land use can be reduced by recognizing these effects in advance and modifying the land use accordingly. (3) The consequences of structural manipulation of water can be evaluated by analyzing the short-term, long-term, off-site, and on-site effects of the proposed change. (4) The shoreline erosion of Lake Tahoe could be evaluated in terms of damage done during which water levels and the feasibility of lowering the lake during periods when storms are most likely to occur. (5) Climatic conditions such as smog or man-made weather modification could be evaluated in terms of their consequences to the natural drainage systems. (Davis-Chicago)
W73-06906

WATER RESOURCES IN THE LAKE TAHOE REGION.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.
For primary bibliographic entry see Field 06E.
W73-06907

SUMMARY WATER AND SEWERAGE STUDY FOR THE OLD COLONY REGIONAL PLANNING DISTRICT.
Old Colony Regional Planning District, Abington, Mass.

1970. 16 P, 2 FIG, 4 TAB.

Descriptors: *Water supply, *Sewerage, *Comprehensive planning, Facilities, Water demand, Water supply development, Alternative planning, *Massachusetts.
Identifiers: *Old Colony region (Mass).

The comprehensive water and sewage study conducted for the Old Colony Region is summarized, and its conclusions and recommendations are presented. The study was conducted in three phases: Phase One included the inventory of the existing situation and facilities; Phase Two consisted of the determination of future needs and identification of alternatives to meet these needs; and Phase Three was the analysis of alternative solutions and selection of a plan for water and sewerage development in the Region. (Davis-Chicago)
W73-06908

PLANNING TO SAVE NATURAL RESOURCES IN RESIDENTIAL DEVELOPMENT,
New York State Capital District Region. Cooperative Extension Service, Oneida County.
D. J. White, and E. J. Kresse.
Journal of Soil and Water Conservation, Vol 27, No 4, p 152-155, July-August 1972. 9 fig, 1 tab.

Descriptors: *City planning, *Community development, *Natural resources, Aesthetics, Costs, Methodology, Analytic techniques, Storn runoff, Soil stabilization.
Identifiers: *Residential development.

Natural resources can play an important role in residential development. Used properly, they can enhance the landscape and monetary value of individual homesites and the total development. They can reduce development costs; help control runoff, erosion, and sedimentation; and contribute to the aesthetic appeal of an entire community. Whenever and wherever possible, natural resources should be carefully inventoried and incorporated into the site plan for any proposed development. A technique was developed for use in a bi-county environmental housing program sponsored by 17 different organizations, agencies, and groups. The technique considers the importance of natural resources in residential development and illustrates how resource information can be incorporated into site plans. (Davis-Chicago)
W73-06909

WATER AND SEWERAGE PLAN AND PROGRAM– 1971-72.
Metropolitan Washington Council of Governments, Washington, D.C.

October 1971. 246 p, 19 fig, 21 tab, 34 ref, 11 append. HUD-D.C.-P-15.

Descriptors: *Water supply, *Sewerage, *Management, Regional analysis, *Water policy, Waste water treatment, Facilities, Project planning, Land use, Short-term planning, Water shortage, Water storage, Water pollution, Urbanization, Storm runoff, Financing, *District of Columbia.
Identifiers: *Washington (D.C.), Regional planning, Residential development.

Existing problems and concerns related to metropolitan water and waste water management are identified; objectives and policies regarding water and sewerage facilities are described; and functional planning and programming of water and sewerage facilities are related to areawide land use policies. This study outlines the elements of a regional water and sewerage plan and a short-range program for the 1972-77 period. Major issues in the Metropolitan Washington area include: the possibility of water shortages in the summer months due to the variability of flow of the Potomac River and the lack of off-stream water storage capacity and interconnections between major systems to deal with emergency situations; the pollution of the Potomac River due primarily to insufficiently treated effluent from the region's waste water treatment plants; sewer moratoria and the possible significant influence upon the location and cost of new residential development; localized sewer service problems affecting low and moderate income households requiring public attention in order to provide upgraded service; and on-site retention of stormwater runoff, multiple use of facilities, and development mechanisms to insure adequate water/sewer financing as promising areas for future investigation in water and waste water management. (See also W71-07202) (Davis-Chicago)
W73-06912

COMPREHENSIVE WATER AND SEWERAGE PLANNING, GRAYSON COUNTY TEXAS.
Freese, Nichols and Endress, Fort Worth, Tex.

Report prepared for Texoma Regional Planning Commission, Denison, Texas, May 1972. 136 p, 51 fig.

Descriptors: *Water supply, *Sewerage, *Comprehensive planning, Population, Economics, Land use, Facilities, *Texas.
Identifiers: *Grayson County (Texas), Economic analysis.

This plan discusses the following subjects in developing its proposals for water and sewerage development: general physical description of the study area, population and demographic analysis, economic analysis, land use analysis, a description of existing municipal water systems, an analysis of rural water supply corporations and other privately owned water systems, an analysis of sewerage systems in the region and miscellaneous data pertaining to sewerage. (Davis-Chicago)
W73-06914

AREAWIDE WATER AND SEWER PLAN AND PROGRAM, CHAMPAIGN COUNTY, ILLINOIS.
Champaign County Regional Planning Commission, Urbana, Ill.

May 4, 1972. 150 p, 20 tab, 39 map, 9 append, 48 ref.

Descriptors: *Planning, *Water supply, *Sewerage, *Storm drains, *Regional analysis, Short-term planning, Long-term planning, Future development (Projected), Water policy, Water demand, Facilities, Illinois.
Identifiers: *Champaign (Ill), *Goals, *Objectives, *Policy, Metropolitan water resources management.

This study answers three basic questions. What are the available resources and existing facilities. What are the short and long range needs, objectives and constraints associated with the use of these resources and facilities. How can short and long range and sewer planning objectives for Champaign County be met within the constraints of desirable areawide growth and available resources. A goals/objectives/policies planning framework is utilized to investigate the basic questions. Goals are broad statements of desirable conditions to be achieved. Goals are usually noncontroversial and generally independent of changing conditions of changing technology. Objectives are targets to be achieved. Such targets are governed by specific problems to be solved, by constraints of place and time, by constraints of economics, technology, and by legally-sanctioned standards of design and performance. Policies are guidelines for action directed toward the achievement of objectives and meeting of standards. Various water supply systems, sewerage systems, and storm drainage systems within the study area utilizing the planning framework are described and analyzed. (Davis-Chicago)
W73-06915

COMPREHENSIVE SANITARY SEWERAGE AND STORM DRAINAGE FACILITIES PLAN FOR THE INCORPORATED COMMUNITIES, PREPARED FOR LIMA - ALLEN COUNTY REGIONAL PLANNING COMMISSION.
Browne (Floyd G.) and Associates Ltd., Marion, Ohio.
For primary bibliographic entry see Field 05G.
W73-06917

PHASE II: REGIONAL WATER, SEWERAGE, AND DRAINAGE PROGRAM, INITIAL PLAN.
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 03D.
W73-06918

MANAGING THE NATURAL ENVIRONMENT, A REGIONAL PLAN FOR WATER, SEWAGE, AIR, AND REFUSE,
Tri-State Transportation Commission, New York.
For primary bibliographic entry see Field 03D.
W73-06920

INTERIM PLAN FOR WATER QUALITY MANAGEMENT, EL PASO AND TELLER COUNTIES.
Pikes Peak Area Council of Governments, Colorado Springs, Colo.
For primary bibliographic entry see Field 05G.
W73-06921

PRELIMINARY DETAILED PLANS FOR SPOKANE RIVERFRONT DEVELOPMENT.
Spokane County Planning Commission, Wash.
For primary bibliographic entry see Field 06F.
W73-06922

THE TIDE OF INDUSTRIAL WASTES,
For primary bibliographic entry see Field 05B.
W73-06924

A PLANNING MODEL TO PROJECT THE POTENTIAL FOR DESALTING IN THE UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 03A.
W73-07018

FEASIBILITY OF DESALTING MUNICIPAL WATER SUPPLIES IN MONTANA,
Control Systems Research, Inc., Arlington, Va.; and Montana Water Resources Board, Helena.
For primary bibliographic entry see Field 03A.
W73-07019

YORK RIVER BASIN: PHASE I. ADDENDUM--STATE RIVER BASIN WATER QUALITY PLAN.
Virginia State Water Control Board, Richmond.
For primary bibliographic entry see Field 05G.
W73-07036

CALIFORNIA'S OCEAN RELATED NEEDS, A STUDY TO DETERMINE THE OCEAN RELATED NEEDS AND TO IDENTIFY PROGRAMS TO MEET THE NEEDS,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
J. J. Sullivan.
Available from the National Technical Information Service as COM-72-10697, $3.00 in paper copy, $0.95 in microfiche. Sea Grant Program Publication No 20 (Institute of Marine Resources Reference No 72-11), January 20, 1972. 42 p, 23 tab. NOAA Sea Grant Office Grant No 112.

Descriptors: *Oceanography, *Pacific Ocean, *California, *Water demand, *Water requirements, Water resources development, Planning, Conservation, Water pollution, Economics, Legislation, Environmental control, Reviews, Surveys.
Identifiers: *Sea Grant Program, Interviews, Polls.

The purpose was to provide an answer to each of two questions: (1) what are the ocean-related needs of the State of California as expressed by government, people, and industry, and (2) what can the Sea Grant Program in California do to assist in the fulfillment of the expressed needs. The persons chosen for interviews were state officials, industrial leaders, local officials, federal agencies, and people who were already carrying on research on ocean-related problems. Personal interviews were held with 84 persons during July, August, and September, 1971. Tables contain tabulations of responses given to nine major questions asked of each interviewee. Two general classes, 'Planning and Management' and 'Education and Research', were clearly indicated as having highest priority. This was further supported by results in two other classes: any needs or problems which are preservation/conservation oriented are solvable according to the interviewees, only by the application of wise planning and management and by education and research. (Woodard-USGS)
W73-07043

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

AN ANALYSIS OF ATTITUDES AND OPINIONS OF ST. JOE RIVER BASIN LANDOWNERS TOWARDS WILD AND SCENIC RIVERS,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W73-06503

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS VOLUME V: A METHOD OF DATA REDUCTION FOR WATER RESOURCES INFORMATION STORAGE AND RETRIEVAL,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 07C.
W73-06505

SURFACE OXIDATION OF THE VISTULA NEAR OSWIECIM,
For primary bibliographic entry see Field 05G.
W73-06860

TAXATION AND WATER POLLUTION CONTROL,
Pennsylvania State Univ., University Park. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W73-06865

A MINERAL ECONOMICS APPROACH TO ENVIRONMENTAL CONTROL,
Pennsylvania State Univ., University Park. Dept. of Mineral Economics.
For primary bibliographic entry see Field 05G.
W73-06886

EVALUATION OF PHOTOGRAMMETRIC CROSS SECTIONS FOR EARTHWORK PAYMENT,
Wisconsin Dept. of Transportation.
For primary bibliographic entry see Field 08D.
W73-06994

MINIMUM EXPECTED COST OPTIMIZATION,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 08A.
W73-06996

6D. Water Demand

DEVELOPMENT OF MODEL FOR PRICING WATER IN PROVIDING A BASIS FOR ALLOCATING WATER AMONG COMPETING USES,
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 05G.
W73-06507

TEXOMA REGION AREAWIDE WATER PLAN PHASE II.
Freese, Nichols and Endress, Fort Worth, Tex.
For primary bibliographic entry see Field 06B.
W73-06607

REPORT ON WATER DISTRIBUTION IN THE LAKE TAHOE REGION.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.

(1967), 14 p, 1 map, 2 ref, append.

Descriptors: Water distribution (Applied), *Community development, *Distribution systems, Facilities, Public utilities, Water quality standards, Urbanization, California, Nevada.
Identifiers: *Lake Tahoe, Fire protection supply.

Although the largest fresh-water lake in California is within the confines of the Tahoe Basin, the Basin, as a whole, has never had adequate water distribution systems to serve the public. There are 66 separate water companies in the Tahoe Basin, some of which have multiple isolated water systems. Present trends in the development of water distribution are discussed. Water distribu-

tion goals and recommendations of the Tahoe Regional Planning Agency are outlined: maintain Federal water quality standards; water systems should provide adequate supplies for fire protection as well; existing developed areas should be required to meet these standards; and new developments should be required to meet these standards. A brief description of the various individual water systems is included. (Davis-Chicago)
W73-06613

1972 OBERS PROJECTIONS ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 1: CONCEPTS, METHODOLOGY, AND SUMMARY DATA.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06B.
W73-06620

FOSSIL FUEL SUPPLIES AND FUTURE ENERGY NEEDS,
Illinois State Geological Survey, Urbana.
H. E. Risser.
EOS, Transactions of the American Geophysical Union, Vol 52, No 11, p 763-767, November 1971. 10 fig.

Descriptors: *Fuels, *Fossil fuels, *Electric power demand, Electric power production, Energy budget, *Energy conversion, Oil, Oil fields, Natural gas, Coals, Nuclear energy, Breeder reactors.

According to preliminary estimates, electric utilities in 1970 consumed 17,000 trillion Btu of energy to produce 1258 billion kilowatt hours of electricity. Of the energy input, 15.6% was provided by water power, 1.2% by nuclear power, and the remaining 83.2% by fossil fuels - oil, gas and coal. Distribution patterns and wealth of reserves are presented. Coal is still the most important source of energy for electric power, the annual consumption amounting to 324 million tons (1970). In spite of huge reserves of coal in the United States, only a fraction can be economically utilized due to the 1% sulfur limit. The only remaining source of energy in the future is nuclear energy, provided the breeder or fusion reactor is developed in the next 10 to 20 years. (Oleszkiewicz-Vanderbilt)
W73-06683

THE FAST BREEDER REACTOR: A SOURCE OF ABUNDANT POWER FOR THE FUTURE,
North American Rockwell Corp., Canoga Park, Calif. Atomics International Div.
H. Dieckamp.
EOS Transactions of the American Geophysical Union, Vol 52, No 11, p 756-762, November 1971. 15 fig.

Descriptors: *Breeder reactors, *Nuclear energy, *Nuclear powerplants, Thermal powerplants, Powerplants, Electric power demand, Nuclear reactors, Fuels, Nuclear engineering, *Thermal pollution, Economics, Cost-benefit analysis, Electric power production.
Identifiers: *Waste heat.

The fast breeder reactor is essential to meet the future energy needs of our society. This capability derives from three fundamental factors. (1) The fast breeder reactor maximizes the utilization of valuable natural resources and as a direct result can supply energy to an expanding industrial society for many generations. Supplies of other energy sources are diminishing. (2) The fast breeder reactor can achieve this goal while protecting the environment better than any other currently available economic method of generating power. A 1000 Mwe fast breeder reactor would use only about 1 ton of uranium per year. The heat rejected would be less than that from an equivalent light water reactor and about the same as that from the condenser cooling water of a fossil-fueled plant. (3) The fast breeder is based upon established technology and is therefore ready for commercial introduction. (Oleszkiewicz-Vanderbilt)
W73-06685

BY-PRODUCTS OF NUCLEAR POWER,
Atomic Energy Research Establishment, Harwell (England). Separation Processes Group.
For primary bibliographic entry see Field 05G.
W73-06699

A METHOD OF LONG-RANGE PLANNING OF WATER SUPPLY FOR AGRICULTURE AND THE COUNTRYSIDE,
A. Tuszko.
Available from the National Technical Information Service as Part of TT 70-55098/5, $3.00 in paper copy, $0.95 in microfiche. Translated from Gospodarka Wodna, Vol 30, No 5, p 18-23, 1970. 2 fig.

Descriptors: *Water demand, *Water supply, *Investment, *Agriculture, Evaluation, Water utilization, Planning.
Identifiers: *Poland.

Three criteria for evaluating the effectiveness of water supply investments are presented. The criteria are (1) a deficiency index which accounts for the present and expected difficulties of obtaining water, (2) an index of the efficiency of investment outlays, and (3) an index of the intensity of production. The deficiency index is a function of the number of farms deprived of water relative to the total number of farms present in the particular settlement under investigation. The index of efficiency of investment outlays (also termed the index of economic management of the water supply network system) is measured by the length of the water supply network system falling to one inhabitant. This efficiency index is computed as the ratio of the length of the water supply network to the number of inhabitants. The index of intensity of production is assessed with reference to 100 hectares of farmland, using Blohm's method of calculation. This index is the sum of partial indices, calculated with reference to farm and livestock production. Combining these three indices provides a comparative evaluation of the various settlements' water demands. (Settle-Wisconsin)
W73-06859

WATER AND SEWER PLAN AND PROGRAM, SANTEE-WATEREE REGIONAL PLANNING COUNCIL.
For primary bibliographic entry see Field 06B.
W73-06897

A PLANNING MODEL TO PROJECT THE POTENTIAL FOR DESALTING IN THE UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 03A.
W73-07018

YORK RIVER BASIN: PHASE I. ADDENDUM--STATE RIVER BASIN WATER QUALITY PLAN.
Virginia State Water Control Board, Richmond.
For primary bibliographic entry see Field 05G.
W73-07036

6E. Water Law and Institutions

ECONOMIC, POLLTICAL AND LEGAL ASPECTS OF COLORADO WATER LAW,
Colorado State Univ., Fort Collins. Environmental Resources Center.
G. E. Radosevich, K. C. Nobe, K. L. Meek, and J. E. Flack.
Available from the National Technical Information Service as PB-217 868, $3.00 in paper copy, $0.95 in microfiche. Colorado Environmental Resources Center, Fort Collins, Completion Report Series No. 44, February, 1973. 140 p, 3 fig, 13 ref, 9 append. OWRR A-013-COLO (4). 14-31-0001-3506.

Descriptors: Water distribution, *Social change, *Water law, Social impact, Economic impact, Water rights, *Colorado, Water utilization, Water reuse, Prior appropriation, Water allocation, *Political constraints, History, *Institutional constraints.

Water to Colorado is like oil to Iran; the economy of the state relies heavily upon direct and indirect benefits resulting from the utilization for various purposes throughout the state. But, unlike oil, water can be used and reused from the place where it falls until it leaves the jurisdiction of Colorado. Early settlers in the state partially conceived and fully accepted the doctrine of prior appropriation to direct the use of this resource, an action that has determined the destiny of water allocation and distribution up to the present time. This project traces the evolution of water law and related organizations, focusing upon changes that have occurred and the effects upon various water user groups. Specific emphasis was placed upon a determination of the use of technology in the legal process and upon identifying the sources and nature of political constraints that operate to restrict and/or facilitate changes in Colorado water law.
W73-06511

THE IMPACT OF INSTITUTIONAL AND POLITICAL FACTORS ON WATER MANAGEMENT IN THE UPPER WABASH BASIN,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
M. C. Quinn.
Available from the National Technical Information Service as PB-217 870, $4.50 in paper copy, $0.95 in microfiche. Indiana Water Resources Research Center, Lafayette, Technical Report No. 35, 1973. 54 p, 2 fig, 36 ref. OWRR-A-014-IND (2).

Descriptors: Institutions, *Institutional constraints, *Management, *Political aspects, Water resources development, *Administrative agencies, Organizations, Water policy, Economics, Flood control, Water supply, Water quality, Recreation, Navigation, *Indiana.
Identifiers: *Wabash Basin.

The impact of institutional and political factors on water management in the Upper Wabash Basin is discussed. The need for alternatives in water management and the ability of systems analysis to generate these alternatives are discussed. The physical and economic setting is described. A more extensive discussion of the public and private organizations involved in water management and the policies and programs in effect is included. The factors which tend to limit the use of systems analysis methods are summarized.
W73-06513

RESEARCH ON DECISION MAKING AND RELATED MANAGERIAL ASPECTS OF BRITISH WATER RESOURCES PROGRAMS - EMERGING FORCES IN BRITISH WATER RESOURCES DEVELOPMENT,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
E. S. Flash, Jr.
Available from the National Technical Information Service as PB-217 871, $3.00 in paper copy, $0.95 in microfiche. Technical Report No. 61, (1973). 25 p. OWRR A-022-NY (1). 14-01-0001-1852.

Descriptors: *Water resources development, *Organizations, *Multiple-purpose projects, *Planning, Rivers, Governments, Water quality, Water quantity, United States, Political aspects, Administrative agencies, *Decision making.
Identifiers: *Great Britain.

British water resources development is currently dominated by the following issues: (1) the inseparability of water quantity from water quality; (2) the interdependence of water resources development with other aspects of development policy; (3) the growing objection to surface storage; (4) the conflict over determining who pays and who benefits; (5) the ambivalence towards water resources planning; and (6) the concept of water as a dynamic resource. In order to learn what the British are doing and provide a comparative base for evaluating experience in the States, a survey has been made of these issues dominating the development of water resources in Great Britain. The survey, carried out in England during the 1968-69 academic year in conjunction with a study of the 1964-67 controversy over locating a reservoir at Cow Green on the Tees River, centers upon a review of relevant legislation, published material, government documents, and interviews with representatives of governmental and non-governmental organizations. The 29 river authorities of England and Wales, established under the Water Resources Act of 1963, appear to be emerging as the most significant organizations in the development and execution of water resources policy: The span of concern of river authorities is most likely to coincide with the substantive, political, and administrative dimensions of water resources development. (Bell-Cornell)
W73-06514

ALTERNATIVE ECONOMIC EVALUATION PROCEDURES AND WATER DEVELOPMENT PROJECTS: THE MULTIPLE OBJECTIVE PROBLEM,
Oregon State Univ., Corvallis. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W73-06516

SEAL BEACH NATIONAL WILDLIFE REFUGE.

Senate Comm. on Commerce, Senate Rep. No 92-1075, 92d Cong, 2d Sess, August 17, 1972. 9 p.

Descriptors: *Wildlife habitats, *Salt marshes, *Estuaries, *Natural wildlife refuges, *California, Legislation, Parks, Migratory birds, Fish conservation, Preservation, Oil wells, Tidal marshes, Public lands, Estuarine environment, Waterfowl.
Identifiers: *Congressional hearings.

This report recommends that the bill to establish the Seal Beach National Wildlife be passed. The legislation is designed to protect and preserve a salt water marsh and estuarine habitat for migratory waterfowl and other wildlife in Southern California. Various agencies approved or expressed no opinion on the bill. The bill is characterized as being necessary to protect a tidal slough which is the last pristine salt water marsh on the Southern California coast between San Diego and Morrow Bay. A Naval Weapons Station borders the marsh, and would be primarily accountable for the area. The marsh was in danger of being disturbed by highway construction; this bill would foreclose any possibility of such destruction of the marsh. Various department reports accompany the report noting the value of the marsh as a refuge and a public area for visitors and residents. (Smith-Adam-Florida)
W73-06533

SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE.

Senate Comm. on Commerce, Senate Rep. No 92-859, 92d Cong, 2d Sess, June 14, 1972. 16 p.

Descriptors: *National wildlife refuges, *Estuarine environment, *Wetlands, *Bays, Migratory birds, California, Wildlife conservation, Recreation, Water conservation, Wildlife conservation, Shore birds, Estuaries, Land use, Water resources development, Legislation, Wildlife habitats, Tidal marshes.

H.R. 1243 provides for the establishment of the San Francisco Bay Wildlife Refuge. The refuge, comprised of four distinct units consisting of approximately 21,662 acres of tidal flats, marshes, salt ponds, submerged lands and open water, would: (1) preserve South Bay lands natural resources, including habitats for migratory birds, harbor seals, and certain endangered species; (2) preserve remaining open space; and (3) provide for wildlife oriented recreational opportunities. The bill authorizes the appropriation of $20.3 million, of which $9 million is alloted for acquisition purposes. The Department of Interior recommended enactment, noting that between 1947 and 1967 approximately 67% of California's estuarine wildlife habitat had been destroyed by dredge and fill activity, and that, unless action is taken to prevent further urban encroachment, all of the South Bay's remaining wetlands will be developed by the year 2000. (Adams-Florida)
W73-06534

WATERSHED IMPROVEMENT DISTRICTS.
N.C. Gen. Stat. secs. 139-16 thru 139-38. (Supp. 1971).

Descriptors: *Legislation, *Watershed management, *North Carolina, *Watersheds (Basins), *Water supply development, Water management (Applied), Water, Water supply, Financing, Administrative agencies, Permits, Planning, Regulation, Eminent domain, Condemnation, Soil conservation, Governmental interrelations, Municipal water, Water demand.

Watershed improvement districts may be established within one or more soil conservation districts or within and without such districts, in accordance with the provisions of this article, provided that no watershed improvement district may be established after January 1, 1972. The procedures to be followed in the collection and payment of assessments and the expenditures of the proceeds and other funds are detailed in the statute. All plans for contemplated works of improvement must be submitted to the State Board for review and for approval or disapproval. Any local unit may issue bonds or other obligations, in the manner specified by the statute, for the purpose of financing all or any part of the cost of providing storage capacity for anticipated future or present water supply needs, in conjunction with any watershed improvement work or project. Watershed improvement districts are given the power to acquire by condemnation any interest in land needed in carrying out the purposes of this act. The procedures and limitation on this power of eminent domain are stated in the statute. (Reed-Florida)
W73-06535

PASSAIC VALLEY SEWERAGE DISTRICT; PASSAIC RIVER BASIN.
N.J. Stat. Ann. secs. 58:14-13 thru 58:16B-4 (Supp. 1971).

Descriptors: *New Jersey, *Sewerage districts, *Legislation, *Flood control, Bond issues, Financing, Flood plains, Flood damage, Flood protection, River basin development, Water policy, State governments, Waste treatment, Sewage treatment, Sewerage, Sewers.

Each contracting municipality within the Passaic Valley sewerage district is responsible for its share of the cost of work necessary to keep the sewerage system in a state of efficient operation and also for capital improvements to the system necessary to enlarge it. For the purposes of raising funds to pay the cost of any of the projects, the Passaic Valley Sewerage Commissioners shall have the power to authorize the issuance of bonds. The Department of Environmental Protection is authorized to dredge and desnag the rivers and tributaries, to improve bridges and to purchase flood plain lands within the Passaic River Basin for purpose of flood control and protection for the safety and general welfare of the residents of the region. (Glickman-Florida)
W73-06536

SUBSURFACE AND PERCOLATING WATERS.
N.J. Stat. Ann. secs. 58:4A-5 thru 58:4A-26 (Supp. 1971).

Descriptors: *New Jersey, *Percolating water, *Well permits, *Legislation, *Well regulations, Subsurface waters, Water law, Legal aspects, Regulation, Water wells, Administrative agencies, Drilling, Logging (Recording), Wells, Penalties (Legal), State governments, Adjudication procedure, Groundwater mining, Groundwater.
Identifiers: Licenses.

A person, partnership or corporation that engages in well drilling will be required to be licensed as a well driller. A board of seven well drillers will be appointed by the Commissioner of Conservation and Economic Development as an examining board for well drillers. The board will have the duties of examining the qualifications of those applying for licenses and shall also formulate rules, regulations and standards for engaging in well drilling. The board can suspend the license of anyone it finds guilty of incompetency and misconduct, or fraudulently obtaining a license. No well may be drilled until a permit to drill has been obtained. A further condition of issuance of this permit may be that the driller preserve samples of materials encountered in sinking the well, and deliver them to the state geologist. Within sixty days of the drilling of the well a set of prescribed forms shall be filed with the department giving various information about the well that the department shall require. Persons who drill wells without the required licenses shall be enjoined from such actions and subject to a fine. (Glickman-Florida)
W73-06537

DEPARTMENT OF WATER AND AIR RESOURCES.

N.C. Gen. Stat. secs. 143-211 thru 143-215.10 (Supp. 1971).

Descriptors: *North Carolina, *Legislation, *Water pollution control, *Pollution abatement, *Administrative agencies, Air pollution, Water quality standards, Legal review, Adjudication procedure, Water pollution, Impaired water quality, Abatement, Legal aspects, Permits, Planning, Governmental interrelation, Local governments.

Pursuant to North Carolina's declared public policy of providing for the conservation of its air and water resources, the Department of Water and Air Resources was created. The Department is governed by the Board of Water and Air Resources. The statute specifies the qualifications and duties of the Board's members, as well as the powers of the Board. The Board has the authority to accept and administer any financial assistance provided under any federal act or from any federal agency. The Board is directed and empowered to establish water and air quality standards and classifications. The Board is authorized to issue a special order to any person whom it finds responsible for causing or contributing to any water pollution, unless it is impossible for such person to correct or

eliminate the activities causing or contributing to such pollution. The power to act in local administration of all matters covered by existing or future federal legislation relating to water quality control is delegated to the Board. The procedures to be followed by the Board are specified and provision is made for judicial review of final orders issued by the Board. (Reed-Florida)
W73-06538

CITIZENS UTILITIES COMPANY V. ILLINOIS POLLUTION CONTROL BOARD (POLLUTION CONTROL BOARD'S AUTHORITY TO IMPOSE CONDITIONS ON THE GRANT OF A VARIANCE).
289 N.E.2d 642 (App. Ct. 111.1972).

Descriptors: *Illinois, *Judicial decisions, *Administrative decisions, *Waste treatment, Regulation, State jurisdiction, State governments, Water law, Administrative agencies, Adjudication procedure, Water policy, Legal aspects, Decision making, Standards, Water quality control, Water pollution, Administration, Sewage lagoons, Water pollution control, Tertiary treatment, Legal review.

Petitioner, utility company, sought a variance under the Illinois Environmental Protection Act to temporarily discontinue operation of a sewage lagoon in order to install a tertiary treatment system. The Pollution Control Board granted the variance but attached conditions to the order including a $1,000 penalty. Petitioner appealed contending that the conditions imposed were against the weighted evidence, too vague and exceeded statutory authority. The appellate Court of Illinois held that the act indicates a specific intent to exclude penalties as part of the conditions of a grant of variance and that the Pollution Controll Board has authority to implement regulations designed to deal with potential polluters who bank on variance proceedings and hardship to the public to relieve them of liability. The court further held that certain portions of the order were vague and unenforceable as worded; however, the evidence supported the attaching of certain conditions to the grant of the variance. The court therefore affirmed the order in part and reversed the order in part. (Beardsley-Florida)
W73-06539

PROCEDURE IN THE DEVELOPMENT OF INTERNATIONAL DRAINAGE BASINS,
British Columbia Univ., Vancouver. School of Law.
C. B. Bourne.
University of Toronto Law Journal, Vol 22, p 172-206, 1972. 115 ref.

Descriptors: *Drainage basins, *Inter-basin transfers, *International law, *International waters, Legal aspects, Developed waters, Information exchange, River basins, River basin development, Jurisdiction, Water utilization, Water resources development, Judicial decisions, Treaties.

The substantive law on utilization of the waters of international drainage basins is defined in the vague language of the doctrine of equitable utilization and offers little direction to the states on how they may proceed lawfully with utilization of these waters in their territories. Shortcomings in substantive law, however, may be offset to some extent by a body of procedural law. The question is: does international law prescribe a precedure to be followed by states in the development of international drainage basins. In particular, does it impose an obligation on a state to give notice of proposed works to co-basin states, to furnish them with information about these works, or to allow them access to its territory to gather this information. This study of leading authorities is in favor of cooperation among states in the development of international drainage basins; notice of proposed works or utilization of the waters must be given and information provided to the co-basin states under principles of international law. Whether these principles are legally binding, however, cannot be answered. (Tolle-Florida)
W73-06541

PROPRIETY OF COURT'S CONSIDERATION OF ECOLOGICAL EFFECTS OF PROPOSED PROJECT IN DETERMINING RIGHT OF CONDEMNATION,
J. A. Bryant, Jr.
47 ALR3d 1267-1270 (1972). 4 p, 5 ref.

Descriptors: *Environmental effects, *Condemnation, *Eminent domain, *Judicial decisions, Legal aspects, Legal review, Ecosystems, Pollutants, Pollution control, Pollution abatement, Regulation, Legislation, Florida, Local governments, State governments.

With ecology in the forefront of present day concerns, some courts have considered whether a proposed project will result in harm to the environment in determining the right of condemnation. The general standard of review used by authorities vested with the right of eminent domain is whether the action is in substantial compliance with the law, and whether it is arbitrary or capricious or amounts to an abuse of discretion. Thus, ecological arguments against condemnation should be presented to the court in the context of such considerations. While there are not enough cases to generalize, there are indications that courts will consider the ecological impact of a proposed project in determining the right of condemnation. The leading case arose in Florida. The court's holding indicates that where condemnation is sought in furtherance of a project affecting natural resources, and public authorities must otherwise approve the project before its implementation, the judiciary has the power to require that safeguarding of the public interest be demonstrated by the condemning authority. (Glickman-Florida)
W73-06544

INJUNCTION--DIVERSION OF WATER BY CITY,
W. R. Habeeb.
42 ALR3d 426-474 (1972). 49 p, 13 ref.

Descriptors: *Judicial decisions, *Diversion, *Water management (Applied), *Water distribution (Applied), Running water, Local governments, Muncipal water, Dams, Controlled drainage, Drainage, Reservoirs, Water utilization, Electric power, Flood control, Irrigation, Eminent domain, Damages, Public rights, Public benefits.
Identifiers: *Injunctions, *Standing, Evidence, Sovereign immunity.

This annotation is divided into an introduction to prefatory matters and a summary; it has a discussion of municipal corporation and public utility activities, the availability of injunctive relief against each, damages as a factor and public use or interest as a factor. The index covers a wide range of affected topics such as: diverting of waters from an artesian basin, discretion of the court, eminent domain, and others. There are 172 such topics, some with multiple subdivisions. The annotation discusses standing to bring action upon a presumed improper diversion of water and gives pointers as to proper tactics to bring suit. States with extensive or pertinent litigation upon the subject are discussed, and their holdings are described as being within the majority or minority view. (Smith-Adam-Florida)
W73-06545

ENVIRONMENTAL PROTECTION SUIT--STANDING.

11 ALR Fed. 556-592 (1972). 47 p, 19 ref

Descriptors: *Legal review, *Judicial decisions, *Public rights, *Water pollution control, Legal aspects, Environment, Recreation, Highway effects, Administrative decisions, Dredging, Channeling, Damages, Environmental affects, Parks, Dam construction, Wildlife, Constitutional law.
Identifiers: *Standing (Legal), Injunctions, Dam effects, Private citizen suits.

This annotation collects the federal cases dealing with whether and under what circumstances a private citizen, association, or organization has standing to maintain an action in a federal court for injunctive relief against commercial development or activities, or construction of highways or dams, or ther governmental projects, alleged wildlife refuges. Excluded from this annotation are cases wherein these activities are sought to be enjoined on the theory that they constitute a public nuisance. Recent United States Supreme Court decisions indicate that a plaintiff will have standing in a federal court to protect the environment from harm, if first, he alleges that the challenged action has caused him injury in fact, and second the interests which he has asserted are within the zone of interests sought to be protected by the statute or constitutional guaranty in question. Anumber of federal courts have held that plaintiffs seeking judicial review of administrative action have standing, if they allege that they have been aggrieved within the meaning of a relevant statute. (Reed-Florida)
W73-06546

POTOMAC RIVER BASIN COMPACT.

Md. Ann. Code art 96A secs 111 thru 124 (Supp. 1971).

Descriptors: *Interstate commissions, *River basin commissions, *Potomac River, *Maryland, Water resources development, Water policy, Water conservation, Legislation, State governments, Governmental interrelations, Legal aspects, Water allocation (Policy), Water law, River basin development, Interstate compacts, Water supply development, Water supply, Water quality control, Flood protection, Watershed management, Recreation, Hydroelectric power, Water shortage, Pennsylvania, Virginia, West Virginia, District of Columbia.

Maryland, Pennsylvania, Virginia, West Virginia and the District of Columbia agree to the Potomac River Basin Compact, and establish the Potomac River Basin Advisory Committee to conserve, utilize, develop and manage the water and related resources of the Potomac River Basin. The adoption of coordinated policies for water resources conservation, use and management in the basin, and a comprehensive water resources plan to effectuate such policies shall be objectives of the Commission. The Commission shall develop plans for the development, storage and release of waters and for the regulation of flows and supplies of surface and ground waters for the basin. The Commission shall coordinate efforts to reduce, control and eliminate pollution in order to improve the quality of the waters of the basin. The reduction of flood damage through flood control and the promotion of sound practices of watershed management shall be another object of the Commission. The Commission shall also plan water resources related public recreational projects, as well as secure data to plan for and avoid water shortage. The Commission may borrow money and issue negotiable bonds for any purpose of this compact. (Glickman-Florida)
W73-06547

MARYLAND POTOMAC WATER AUTHORITY.
Md. Ann. Code Art 96A secs 89 thru 104 (Supp. 1971).

Descriptors: *Potomac River, *River basin development, *Maryland, *Administrative agen-

cies, *Flood control, Dams, Legislation, Water law, Watersheds (Basins), Floods, State governments, Governmental interrelations, Assessments, Watershed management, Water supply, Water storage, Government financing, Permits.

The Maryland Potomac Water Authority is created to conserve, control and utilize to beneficial service the storms and floodwaters of the rivers and streams of the Potomac River Watershed. The authority shall have ten members, one each from the represented counties of the district, and all actions must be approved by a unanimous vote of the voting members. It may contract with the federal government for the purpose of acquiring storage in the Bloomington Dam project to be used for regulating the streamflow of the Potomac River for water supply. The authority shall assess and collect charges from the represented counties for the payment of the Maryland shore of the project, and shall also assess non-Maryland users who appropriate water from the Potomac River. A permit is required for appropriations by a non-Maryland user. The counties may, in turn, assess the users within its jurisdiction. (Glickman-Florida)
W73-06548

COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM.
Md. Ann. Code art. 96A secs 75 thru 91 (Supp. 1971).

Descriptors: *Maryland, *Well permits, *Administrative agencies, *Flood data, *Legislation, Drilling, Water policy, Water law, Flood control, Flood forecasting, Watershed management, Regulation, Water pollution control, Water pollution, Water quality, Potomac River.
Identifiers: *Licenses.

The Maryland State Department of Health and Mental Hygiene and the Department of Natural Resources shall submit a report summarizing the water pollution control program for the state. The two Departments may cooperate with appropriate agencies for the training of such personnel as may be needed for that program. No well driller may engage in business in the state under any license other than one issued by the state. The Maryland State Board of Well Drillers is created as part of the Department of Natural Resources. The authority to issue well driller licenses and to make and enforce other regulations designed to carry out this program is vested in the Board. The Board may also revoke licenses of well drillers it finds guilty of fraud in obtaining the license, or gross negligence, incompetence or misconduct in the business of well drilling. The Board may enter reciprocal agreements with other states for licensing of well drillers. The Maryland Potomac Water Authority is created to conserve, control and utilize to beneficial service the storm and floodwaters of the Potomac Watershed. (Glickman-Florida)
W73-06549

EMINENT DOMAIN; RIPARIAN RIGHTS; SEVERABILITY.

Md. Ann. Code art 96A sec 74 (Supp. 1971).

Descriptors: *Maryland, *Administrative agencies, *Condemnation, *Eminent domain, Riparian rights, Legal aspects, Right-of-way, Water policy, Penalties (Legal), Water law, State governments, Regulation, Legislation, Easements, Financing.

The Commission may enter into contracts, sue or be sued, receive and accept payments made to it, adopt detailed plans to develop any facility or project and control and regulate the use of facilities owned or operated by the Commission. The Commission and its property and activities shall be tax exempt. All meetings of the Commission shall be open to the public. The Commissioners shall not be financially interested in any activity to which the Commission is a party. If any contract is to be made and the required expenditure exceeds $5000, it shall be advertised and let upon sealed bids to the lowest responsible bidder. The Commission shall have the power to acquire by condemnation the fee or any lesser interests in lands, riparian rights, water rights, water and other real or personal property within the basin for any authorized project or facility. The Commission is granted the permission to obtain right-of-way for lines, pipes and other authorized facilities. Violation of Commission regulations may subject the violators to a fine. (Glickman-Florida)
W73-06550

OIL DISCHARGE CONTAINMENT, CONTROL AND CLEANUP; WELLS; APPEALS.
Md. Ann. Code art 96A secs 29E thru 57 (Supp. 1971).

Descriptors: *Maryland, *Oil pollution, *Well permits, *Flood protection, Oil spills, Water policy, Water law, Legal aspects, Drilling, Legislation, Administrative agencies, Local governments, Flood control, Flood forecasting, Water resources, Water storage, Water resources development, Well regulation, Wells, Flood data.
Identifiers: Licenses.

No person shall operate an oil terminal facility without a license granted by the Maryland State Department of Natural Resources. Before a license will be issued, the Department will require evidence that the applicant has implemented or is implementing oil pollution control plans. The Maryland Oil Disaster Containment Cleanup and Contingency Fund is established for the purpose of development of equipment, personnel and plans, and for contingency actions to respond to oil discharges. The person responsible for the discharge will reimburse the state, and the reimbursement shall be credited to the fund. No wells may be drilled until a permit has been received from the Department. Upon completion of the well, a final report giving the log of each well shall be filed by the driller. The Department shall provide technical assistance to local governments and other state agencies in interpreting flood information and in drafting local land use and other regulations pertaining to areas subject to flooding. The Department shall cooperate with federal, state and local agencies in water resource projects affecting the state. If there is a water supply storage problem the department shall contract with the appropriate federal authorities for space. (Glickman-Florida)
W73-06551

SUSQUEHANNA RIVER BASIN COMPACT.

Md. Ann. Code art. 96A secs 59 thru 62 (Supp. 1971).

Descriptors: *Maryland, *River basin development, *Watershed management, *Interstate compacts, Water resources development, Water policy, Adminstrative agencies, Legislation, Regulation, State governments, Governmental interrelations, Legal aspects, Political aspects, Federal government, Water conservation, Water law, Water resources, Water allocation (Policy), New York, Pennsylvania.
Identifiers: Susquehanna River, *Susquehanna River Basin Commission.

The states of New York, Maryland, Pennsylvania and the United States agree to the Susquehanna River Basin Compact to conserve, utilize, manage and control the water resources of the Susquehanna River Basin. The Susquehanna River Basin Commission is created to carry out, as agent for the governments involved, the purposes of this compact. The Commission shall develop and effectuate plans, policies and projects relating to the management and conservation of the water resources of the basin. The Commission shall collect data and sponsor research to administer the general plan for resources development. The commission shall promote and aid the coordination of the activities and program of federal, state, municipal and private agencies concerned with water resources administration in the basin. It shall also have the power to allocate waters of the basin to the signatory states to the compact, and may impose related obligation, conditions and release requirements. No project affecting the water resources of the basin shall be undertaken without submission to and approval by the commission. (Glickman-Florida)
W73-06552

POLLUTION ABATEMENT.

Md. Ann. Code art 96A secs 23 thru 29D (Supp. 1971).

Descriptors: *Water quality standards, *Oil pollution, *Maryland, *Water pollution control, *Legislation, Water quality, Water policy, Water law, Oil spills, Water pollution, State governments, Pollution abatement, Water pollution sources, Water quality control, Law enforcement, Penalties (Legal), Administrative agencies, Permits, Waste disposal, Adjudication procedure, Legal review, Damages.
Identifiers: Effluent limitations.

It shall be the duty of the Department to develop programs for the control and abatement of water pollution in the state and to enforce all the rules and regulations of this subtitle. It shall be unlawful to pollute the waters of the state, or to place waste where it might result in pollution, or to discharge waste in violation of Department regulations. The Department shall regulate the transfer, storage and disposal of oil and other unctuous substances to prevent water pollution. Water quality and effluent standards applicable to the waters of the state may be set by the Department. The Department shall have authority to penalize violations of this subtitle and regulations promulgated under it, with a fine of up to $10,000 and/or one year imprisonment. It shall be unlawful to discharge oil upon or into waters of the state, unless unavoidable, and any discharge must be reported. Anyone responsible for such shall be liable for damages caused. Provisions for waste discharges permits are also included. (Glickman-Florida)
W73-06553

POLLUTION CONTROL OF NAVIGABLE WATERS.

33 USC secs 1151 thru 1160, secs 1164 thru 1175 (1970).

Descriptors: *Water pollution control, *Legislation, *United States, *Oil pollution, Water resources, Water pollution, Pollution abatement, Water quality control, Sewage, Sewage disposal, Water pollution sources, Water quality, Grants, Financing, Research and development, Administrative agencies, Sewage systems, Sewage treatment, Great Lakes, Treatment facilities.
Identifiers: Hazardous substances (Pollution).

The purpose of this chapter is to enhance the quality of water resources by establishing a national policy for the control and abatement of water pollution. To effect this purpose the Federal Water Quality Administration is established. The Administrator, in cooperation with the states, shall develop programs for eliminating or reducing the pollution of interstate waters, and shall promote research into the causes and control of water pollution. The Administrator may authorize grants for improvements in sewage disposal, water pollution control programs and construction of sewerage treatment works. The Water Pollution Control Ad-

visory Board is established to advise and consult with the Administrator. Enforcement procedures are provided for effecting the abatement of pollution of interstate waters. The Administrator is authorized to work with the states toward the elimination of pollution of the Great Lakes. Training grants are authorized to be made to institutions of higher education for water quality control programs. The Administrator and Alaska shall provide for facilities for safe water and pollution control in those villages without them. All federal agencies involved with any public works activities of any kind shall insure compliance with water quality standards. (Glickman-Florida)
W73-06555

CONTROL OF POLLUTION BY OIL.

33 USC sec 1161 (1970).

Descriptors: *Legislation, *Water pollution control, *United States, *Oil spills, *Oil pollution, Water pollution, Pollutants, Pollutant identification, Regulation, Penalties (Legal), Water pollution sources, Oil wastes, Federal government, Administrative agencies, Water law, Law enforcement, Oil disasters.
Identifiers: Contiguous zone, Coastal waters.

The discharge of oil into or upon the navigable waters of the United States or waters of the contiguous zone in harmful quantities as determined by the President is prohibited. Under certain circumstances discharges may be allowed if determined not to be harmful by the President. Any owner or operator of a vessel, onshore facility or offshore facility should immediately notify the appropriate United States agency of any discharge of oil. A knowing discharge, or a failure to notify, may result in a fine of up to $10,000. The President is authorized to act or remove discharged oil at any time. He shall publish a National Contingency Plan to limit damages from oil discharge. Whenever a marine disaster creates a pollution hazard the United States may act to insure the elimination of such threat. Unless, the owner or operator of a vessel or facility can show that he was not responsible for the discharge, he may be liable for the costs of removal of the oil, and for damages for any privately or publicly owned property as a result of the discharge. (Glickman-Florida)
W73-06556

CONTROL OF POLLUTION BY HAZARDOUS SUBSTANCES.

33 USC sec 1162 (1970).

Descriptors: *Pollutant identification, *Water pollution control, *United States, *Legislation, Navigable waters, Hazards, Water pollution, Water pollution sources, Penalties (Legal), Regulation, Legal aspects, Negligence, Pollution abatement, Water pollution treatment, Wastes, Ships.
Identifiers: *Hazardous substances.

The President shall designate as hazardous substances such elements and compounds which when discharged in any quantity into or upon the navigable waters of the United States present an imminent and substantial danger to the public health or welfare. Any person in charge of a vessel, onshore or offshore facility shall notify the appropriate agency as soon as he has knowledge of any discharge of such substance. Whenever any hazardous substance is discharged into navigable waters of the United States, unless removal is immediately undertaken by the person responsible, the President shall arrange for the removal of such substance. The owner or operator of the vessel or facility will still be liable for damages to publicly or privately owned property resulting from such discharge. The president shall submit a report to the Congress on the desirability of enacting legislation to impose liability for the cost of removal of discharged hazardous substances. (Glickman-Florida)
W73-06557

CONTROL OF SEWAGE FROM VESSELS.

33 USC sec 1163 (1970).

Descriptors: *United States, *Legislation, *Ships, *Water pollution sources, *Sewage disposal, Water pollution control, Navigable water, Sewage, Sewage treatment, Wastes, Administrative agencies, Water law, Penalties (Legal), Water law, State governments, Pollution abatement, Federal government, Adjudication procedure, Waste disposal.

The Environmental Protection Agency , (EPA), shall promulgate federal standards of performance for marine sanitation devices designed to prevent the discharge of inadequately treated sewage into or upon the navigable waters of the United States. After the effective date of the regulations promulgated herein, no state or political subdivision shall adopt or enforce any statute regulating marine sanitation devices. Where necessary, upon application by a state, the EPA can prohibit any dumping of wastes into certain waters of that state. No manufacturer of a marine sanitation device shall offer it for sale or introduction into interstate commerce until it has been tested by the Secretary of the department in which the Coast Guard is acting. If he determines that it meets the regulations, it will then be certified for marine use. It will be unlawful for a vessel to be offered for sale without the requisite sanitation devices; for any person wrongfully to render inoperative the device; or for a vessel to operate without a certified sanitary device. (Glickman-Florida)
W73-06558

LANDOWNER'S RIGHT TO RELIEF AGAINST POLLUTION OF HIS WATER SUPPLY BY INDUSTRIAL OR COMMERCIAL WASTE.
39 ALR3rd 910-991 (1972). 82 p, 16 ref.

Descriptors: *Water quality control, *Common law, *Water pollution control, *Pollution abatement, Legal aspects, Water pollution, Trespass, Negligence, Law enforcement, Waste water, Industrial wastes, Water quality, Effluents, Damages, Water supply.
Identifiers: Nuisance, Injunctions.

This annotation collects those cases which have considered the rights and remedies of a landowner to prevent, or seek compensation for, the pollution of his water supply, by industrial or commercially produced wastes. The focus is upon the impairment of the landowner's water quality, in contradistinction to a reduction in the quantity of, or diversion of, his waters. The annotation does not purport to reflect the current statutory law of any jurisdiction, and statutes are discussed only insofar as they may be treated in particular cases. Topics include the existence of a right to relief, the nuisance theory, the negligence theory, the trespass theory, types of relief, damages, relief for pollution from particular sources, and the various factors determining the propriety of relief. Where considered appropriate, the history of various statutes is discussed. (Mockler-Florida)
W73-06559

MAINE LAW AFFECTING MARINE RESOURCES, VOL 5, INDEX TO A STUDY CARRIED OUT UNDER THE JOINT SPONSORSHIP OF: THE SCHOOL OF LAW OF THE UNIVERSITY OF MAINE AND THE NATIONAL SCIENCE FOUNDATION OFFICE OF THE SEA GRANT PROGRAMS.
Maine Univ., Portland. School of Law.

1970. 160 P.

Descriptors: *Legislation, *Maine, *Indexing, *Information retrieval, Resources, Legal aspects, Data collections, Constitutional law, Governments, Local governments, State governments, Oceans, Coasts, Commercial fishing.
Identifiers: *Coastal zone management.

Areas covered by this index to Maine Law Affecting Marine Resources are Federal Acts, the United States Constitution, United States Statutes at large, United States Code, States Statutes (other than Maine) and Marine Statutes. A Topical Index is also provided. The index covers four previous volumes in this study of laws affecting marine and coastal resources. (See also W71-03783 thru W71-03786) (Reed-Florida)
W73-06560

ENVIRONMENTAL PROBLEMS OF THE LAKE TAHOE BASIN.
For primary bibliographic entry see Field 05G.
W73-06561

AUTHORIZING CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE O'NEILL UNIT, PICK-SLOAN MISSOURI BASIN PROGRAM.

Report--Comm. on Interior and Insular Affairs--United States Senate, 92d Cong, 2d Sess, September 12, 1972. 18 p.

Descriptors: *Irrigation, *Nebraska, *Watershed management, *Water management (Applied), Irrigation, Reservoirs, River flow, Alteration of flow, Running waters, Dams, Seepage, Irrigation programs, Recreation, Social aspects, Sport fishing, Flood control, Cost analysis, Diversion structures, Legislation, Aesthetics, Missouri River.
Identifiers: Environmental Impact Statements, Dam effects, Niobrara River.

The Committee report recommends legislative authorization for the construction of the O'Neill Unit, Pick-Sloan Missouri (formerly Missouri River) Basin. The unit would develop unused flows of the Niobrara River for irrigation, recreation and fish and wildlife conservation and would provide flood control to the Nebraska areas. The acquisition of land for public use will provide public outdoor recreation. A cost analysis, committee amendments and Executive communications are included. The Department of the Interior wrote a favorable report, and a summary environmental impact statement by the Bureau of Reclamation is included. The impact statement stated that the overall effect of enhancement and mitigation measures and management of project lands on the fish and wildlife resources would be positive; also hunter and fisherman use is estimated to increase 24,000 visitor-days annually. The impact statement mentions adverse environmental effects due to construction of the O'Neill unit and suggests mitigating steps to be taken. (Smith-Adam-Florida)
W73-06562

INTERSTATE SANITATION COMMISSION.

Conn. Gen. Stat. Ann. secs. 25-55 thru 25-66aa (Supp. 1971).

Descriptors: *Connecticut, *Interstate commissions, *Interstate compacts, *Legislation, Water quality, Tidal waters, Air pollution, Administration, Coordination, State governments, Water pollution control, Water quality standards, Adjudication procedure, Legal aspects, Waste treatment, Sewage effluents, Sewage treatment, New York, New Jersey.
Identifiers: Effluent limitations.

This legislation creates the Interstate Sanitation Commission, a tri-state compact between New York, New Jersey, and Connecticut. The primary

purpose of the compact is to insure that no sewage or other pollutants are discharged or permitted to flow into any tidal waters of the district. Specific conditions and restrictions are enumerated with reference to those pollutants which must be treated and the degree of treatment required. Moreover, administrative provisions governing the internal workings of the Commission are promulgated and guidelines for the Commission's public hearings are set out. Finally, the Commissions' powers and duties with respect to air pollution are listed. The waters of the tri-state district are classified and effluent standards applicable thereto are listed. The basis and procedure for the classification of said waters is also described. (Mockler-Florida)
W73-06563

WATER AND ICE SUPPLIES.

Conn. Gen. Stat. Ann. secs. 25-32 thru 25-53 (Supp. 1971).

Descriptors: *Public health, *Legislation, *Water quality control, *Connecticut, *Water supply, Water utilization, Potable water, Water treatment, Treatment facilities, Water sources, Ice, Legal aspects, Administrative agencies, Permits, Planning, Distribution systems, State jurisdiction, Adjudication procedure.

The Connecticut state department of health is given jurisdiction over all matters concerning the purity and adequacy of any source of water or ice supply used by any municipality, public institution or water or ice company. The department is also given jurisdiction over all matters concerning the safety of any distributing plant and system for public health purposes. The adequacy of methods used to assure water purity and such other matters relating to the construction and operation of such distributing plant and system as may affect public health is also within the department's jurisdiction. No system of water supply owned or used by a water company may be constructed or expanded, nor may a new additional source of water supply be utilized until plans therefor have been submitted to and approved by the department of health. If the department finds any pollution or threatened pollution of any system of water supply, or source of water or ice supply, which is prejudicial to public health, it may issue such orders as it finds necessary, to rectify the situation. Cemeteries, except in certain specified circumstances, may not be situated near ice ponds. Judicial review of final decisions by the department may be had. (Reed-Florida)
W73-06564

POLLUTION.
Conn. Gen. Stat. Ann. secs. 25-19 thru 25-29 (Supp. 1971).

Descriptors: *Connecticut, *Water pollution control, *Sewage effluents, *Waste disposal, *Legislation, Legal aspects, Public health, Sewage disposal, Water pollution treatment, Water quality control, Pollution abatement, Treatment facilities, Administrative agencies, Adjudication procedures.

Section 25-26, Chapter 474 of the Connecticut General Statutes, generally prohibits persons, corporations, and municipalities from discharging into any water of the State any sewage prejudicial to public health. The commissioner of environmental protection has the power and duty to investigate all points of sewage discharge which may directly or indirectly result in water pollution. Also, any planned sewage system must be approved by the commissioner. Section 25-26 (a) specifically prohibits discharge into Class A waters or the Salmon River of any sewage or other effluent which is less than tertiary treated. If the commissioner, after investigation initiated by his own office or instigated by other local government departments, finds any water pollution, he may, under Section 25-27, issue orders necessary to abate the pollution. An aggrieved party may appeal such orders to a court of common pleas. After disposition of the appeal, if the commissioner's orders are not complied with, the commissioner may bring a complaint against the offending party and have such orders enforced by a court decree. (Adams-Florida)
W73-06565

WATER RESOURCE COMMISSION.
Conn. Gen. Stat. Ann. secs. 25-1 thru 25-9 (Supp. 1971).

Descriptors: *Connecticut, *Administrative agencies, *Legislation, *Water management (Applied), Environmental control, Water resources, Diversion, Water supply, Municipal water, Water policy, Rivers and Harbors Act, Channel improvement, Channels, Streams, Flood control, Permits, Planning, Algal control.
Identifiers: Nuisance.

The commissioner of environmental protection is directed to conduct a study into algae abatement and control. He is authorized to designate channels for access purposes and to establish stream channel encroachment lines. A comprehensive study of all conditions relating to flood control and water policy needs shall also be made. The Connecticut department of environmental protection, the state department of health and the office of state planning are directed to prepare jointly, a statewide long-range plan for the management of the state's water resources. The duties of the state planning director are specified. Upon approval of the commissioner, whenever any public water system has excess water, that system may sell such water to any other public water systems. River waters may be diverted for public or domestic use, upon obtaining a permit from the commissioner. The commissioner also regulates by permit the erection of structures in tidal, coastal or navigable waters. Included are provisions for application, revocation and modification of the permits. (Reed-Florida)
W73-06566

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION V. U.S. POSTAL SERVICE (SUIT TO ENJOIN CONSTRUCTION UNTIL FILING OF ENVIRONMENTAL IMPACT STATEMENT).

349 F. Supp. 1212 (D.C. Dist. of Columbia, 1972).

Descriptors: *Judicial decisions, *Legislation, *Environmental effects, *Administrative decisions, *United States, Construction, Zoning, Legal aspects, Permits, Political aspects, Legal review, Decision making, Federal project policy, Project planning.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act, Injunctions, Standing.

Plaintiff, park planning commission, sued to enjoin further construction of a bulk mail center by defendant postal service until an environmental impact statement was prepared pursuant to section 102 (2) (c) of the National Environmental Policy Act. Defendant denied such a statement was necessary and established that the project had been approved by the National Capital Planning Commission. However, it had been disapproved by Maryland agencies on environmental grounds. An environmental assessment had been made by the District Engineer who found environmental concerns of no validity, that only minimal effects would accrue to land and water. A good deal of money had been expended, about $1,700,000. and a 6-month delay would cost $678,000. The court concluded that the bulk mail center would not have a significant effect on the environment and that an impact statement was not necessary. The District Court therefore denied plaintiff's motion for an injunction. (Smith-Adam-Florida)
W73-06567

ANDERSON V. NORFOLK AND WESTERN RAILWAY (QUI TAM ACTION UNDER REFUSE ACT).

349 F. Supp. 121 (W.D. Va. 1972).

Descriptors: *United States, *Legislation, *Rivers and Harbors Act, *Pollution abatement, Navigable waters, Tributaries, Waste dumps, Public rights, Watercourses (Legal aspects), Permits, Judicial decisions, Waste disposal, Water pollution control, Legal aspects, Penalties (Legal).
Identifiers: *Standing (Legal), Nuisance (Legal aspects), Qui Tam action, Refuse Act.

Plaintiff private citizen instituted an action on behalf of the government against defendant, railway company, for violating the Refuse Act by discharging liquid and solid refuse into a tributary of a navigable stream. Defendant did not have a permit for such discharge from the Army Corps of Engineers. The District Court for the Western District of Virginia held that plaintiff had no standing to raise the issue as this provision of the Refuse Act called for criminal sanctions, and criminal statutes can neither be enforced by civil action nor by private parties. The court noted that although plaintiff had notified the District Attorney of the violation, that such attorney was immune from interference with his discretionary decision not to prosecute. The complaint was dismissed for failure to state a claim upon which relief could be granted. (Smith-Adam-Florida)
W73-06568

THE 1971 UNITED STATES PROPOSALS ON THE BREADTH OF THE TERRITORIAL SEA AND PASSAGE THROUGH INTERNATIONAL STRAITS,
Louisiana State Univ., Baton Rouge.
H. G. Knight.
Oregon Law Review, Vol 51, p 759-787, 1972. 102 ref.

Descriptors: *Law of the sea, *Military aspects, *International commissions, *International waters, *United Nations, Oceans, Coasts, International law, Submarines, Governmental interrelations, Water pollution, Legal aspects, Commercial fishing, Administrative agencies, Interagency cooperation, Jurisdiction, Treaties, Mining.
Identifiers: *Territorial seas (Jurisdiction).

A review of the four elements of the United States law of the sea package and statements of United States government officials concerning the package, point to two principal objectives of United States ocean policy: (1) to develop a predominantly international regime to govern exploitation of living and non-living ocean resources beyond reasonably narrow limits of national jurisdiction; and (2) to gain international recognition for the principle of free transit through international straits. Articles I and III of the Draft Convention seem to constitute in part a quid pro quo which the U.S. is offering to secure the two objectives. The tradeoffs, are: (1) the twelve-mile territorial sea breadth proposal, which is little more than a recognition of existing facts and therefore of marginal value as a concession; (2) the Draft Convention, which is both a concession to the international community to limit further unilateral claims to maritime areas and to secure support for the straits proposal, and a method for keeping coastal states from controlling seabed beyond the 200-meter isobath for emplacement of anti-submarine warfare devices; and (3) the fisheries proposal. (Tolle-Florida)
W73-06569

AMENDING THE WILD AND SCENIC RIVERS ACT BY DESIGNATING A SEGMENT OF THE ST. CROIX RIVER, MINN. AND WIS., AS A COMPONENT OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM.

Report--Comm. on Interior and Insular Affairs--United States House of Representatives, 92d Cong, 2d Sess, October 11, 1972. 5 p.

Descriptors: *Legislation, *Wild River Act, *Navigable rivers, *Aesthetics, Minnesota, Wisconsin, Recreation, Social impact, Wild rivers, Preservation, Conservation, Tributaries, Scenery, Parks, Eminent domain.
Identifiers: Land and Water Conservation Fund Act.

This committee report favored S.1928 and recommended its passage. The purpose of S.1928 is to designate a 52 mile stretch of the St. Croix River as a unit of the National Scenic Rivers System. It has been viewed as a natural scenic and recreation resource for several years. Retention of natural values of the area are best served by creating a single governmental entity to provide effective control of future development. Funds are allocated for land acquisition and development; an estimated 7,900 acres bordering the river which is now in private ownership would be acquired in fee or easement to provide for public access and facilities. Matching funds can be obtained through the Land and Water Conservation Fund Act. The Department of the Interior recommended enactment and the bill was so enacted. (Smith-Adam-Florida)
W73-06570

TOXIC SUBSTANCES CONTROL ACT OF 1972.

Report--Comm. on Interstate and Foreign Commerce--United States House of Representatives, 92d Cong, 2d Sess, September 28, 1972. 26 p.

Descriptors: *Legislation, *Chemical wastes, *Toxins, *Water pollution sources, Environmental control, Public health, Chemicals, Metals, Testing, Chemical analysis, Chemcontrol, Administrative agencies, Law enforcement, Monitoring, Permits, Water quality, Standards, Regulation.
Identifiers: *Toxic Substances Act, Hazardous substances (Pollution), Injunctions.

The Committee on Interstate and Foreign Commerce recommended that the Toxic Substances Control Act of 1972 be passed as amended. The legislation is designed to supplement federal laws by giving to the Environmental Protection Agency authority to develop a systematic approach to protecting health and the environment from hazardous chemical substances. The Bill provides for the adoption of rules restricting chemical usage. Enforcement of the bill may be obtained through the court's injunctive process or imposition of criminal and civil penalties. Provisions for private citizen suits are included. A detailed analysis is presented of the need for and the provisions of the bill. Letters from various agencies are included. The Department of Health, Education and Welfare wrote on accomodating report as did the general counsel of the Department of Defense. (Smith-Adam-Florida)
W73-06571

A BILL TO AMEND THE ACT OF JULY 4, 1955, AS AMENDED, RELATING TO THE CONSTRUCTION OF IRRIGATION DISTRIBUTION SYSTEMS.

House Bill 9198, 92d Cong, 2d Sess (1972). 12 p.

Descriptors: *Irrigation programs, *United States, *Federal Reclamation Law, *Legislation, *Irrigation, Legal aspects, Water resources development, Distribution systems, Irrigation practices, Irrigation districts, Water supply development, Municipal water, Industrial water, Irrigation engineering, Financing, Cost sharing.

This bill would amend the Act of July 4, 1955, relating to the construction of irrigation and distribution systems. The proposal would provide that distribution and drainage systems authorized to be constructed under the federal reclamation laws may, in lieu of construction by the Secretary of the Interior, be constructed by irrigation districts or other public agencies according to plans and specifications approved by the Secretary as provided in this Act. In addition, the proposal would provide financial assistance for the construction of the aforesaid local distribution and drainage systems; the Secretary would be authorized to make funds available on a loan basis. Moreover, the proposal would provide that the delivery and distribution of municipal and industrial water supplies would be deemed to be an authorized project purpose under the Act, and where appropriate, an allocation of loan funds acceptable to the Secretary should be made between irrigation and municipal and industrial purposes. (Mockler-Florida)
W73-06572

A BILL TO AUTHORIZE THE ACQUISITION OF THE BIG CYPRESS NATIONAL FRESH WATER RESERVE IN THE STATE OF FLORIDA, AND FOR OTHER PURPOSES.
House Bill 13115, 92d Cong, 2d Sess (1972). 7 p.

Descriptors: *Estuarine fisheries, *Wetlands, *Water sources, *Florida, *Eminent domain, *National parks, Freshwater, Ecology, Oil fields, Exploitation, Exploration, Natural gas, Agriculture, Fishing, Legislation, Federal government, Water conservation, Water quality, Water requirements, Condemnation, Ecosystems, Water supply, Estuaries, Swamps.
Identifiers: *Everglades, *Big Cypress Swamp.

The Big Cypress area is ecologically bound with the Everglades National Park. The continued viability of the Everglades, along with the existence of certain estuarine fisheries of South Florida, is directly dependent upon fresh water of adequate quality and quantity from the Big Cypress area. In order to protect the Big Cypress area from further development which would adversely affect its ecology, H.R. 13115 would establish the Big Cypress National Fresh Water Reserve, consisting of not more than 540,000 acres of privately owned land. The bill would authorize the Secretary of Interior to acquire by donation, purchase, transfer or exchange, lands, waters, and other interests within the boundaries of the proposed reserve. Owners of improved property acquired may, as a condition of acquisition, retain rights of use and occupancy for not more than 25 years, or in lieu thereof, for a term ending at the death of the owner or the death of his spouse, whichever is later. The bill would limit and control such activities as the exploration and extraction of gas, oil, and other minerals, hunting, fishing, and agriculture. However, the Miccosukee Indians and Seminole Indians may continue their usual use of the lands and waters within the Reserve. (Adams-Florida)
W73-06573

FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06F.
W73-06576

PUBLIC RIGHTS AND COASTAL ZONE MANAGEMENT,
North Carolina Univ., Chapel Hill. School at Law.
T. J. Schoenbaum.
The North Carolina Law Review, Vol 51, p 1-41, 1972. 206 ref, 1 append.

Descriptors: *North Carolina, *Coastal marshes, *Estuaries, *Land management, *Legislation, Coastal plains, Public rights, Wetlands, Tidal marshes, Navigable waters, Submerged Lands Act, Swamps, Judicial decisions, Common law, Public lands, Legal aspects, Easements.
Identifiers: *Coastal zone management, *Public trust doctrine, Fill permits, Navigability tests.

The pressures of conflicting use patterns have resulted in the realization that governmental management is necessary to preserve the fragile coastal zone areas. A general history concerning public rights in coastal zone areas is presented. The common law test to determine public ownership was that of ebb and flow, such covered lands belonging to the sovereign; the navigability test is the federal guideline to title. Case by case claims settle disputes as to private claims to public lands in North Carolina; North Carolina combines the common law test with the federal test. With reference to other public rights, North Carolina accepts the public trust doctrine. Included is a discussion of the public trust doctrine; public rights in waters over non-public trust lands; and governmental authority in the coastal zone. Special controls are necessary to retain coastal zone quality. Coastal zone legislation and the creation of a coastal zone management agency is recommended. The appendix sets forth a proposed coastal zone management bill for North Carolina, defining goals and providing means to achieve them, for the preservation of coastal areas. It provides for permits and for penalties for failure to comply with its regulations. (Smith-Adam-Florida)
W73-06579

WATERSHED PROJECTS.
For primary bibliographic entry see Field 04D.
W73-06580

POTOMAC RIVER BASIN COMPACT.

Va. Code Ann. sec. 62. 1-69. 1 (Supp. 1971).

Descriptors: *Virginia, *Interstate compacts, *Potomac River, *River basin commissions, *Legislation, Governments, Water resources development, Water quality, Flood control, Recreation, Interstate commissions, Flood protection, Water supply development, Watershed management, River basin development, Water quality control, Pennsylvania, Maryland, West Virginia, District of Columbia.

The Potomac River Basin Compact is created in order to provide broad, continuous guidance for the development and management on a regional basis in order to effectively utilize the Potomac River resources. Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia are represented on the commission. The commission is given specific powers and duties to meet the essential requirements of the present and future populations of the basin, to promote intergovernmental cooperation, to assure and protect desirable developments, and to coordinate water resources planning. Organization, internal procedures, delegation of powers, territorial jurisdiction, budgets, review and approval of water resources projects, and various other administrative details are enumerated. In addition, various articles list the scope of the Commission's powers with reference to water quality management and control, flood protection, watershed management, recreation, and other public values related to conservation of the Potomac River Basin. The Commission is also empowered to acquire and operate facilities for water supply development. (Mockler-Florida)
W73-06581

STATE WATER CONTROL LAW.
Va. Code Ann. secs. 62. 1-44. 2 thru 62. 1-44. 29 (Supp. 1971).

Descriptors: *Virginia, *Legislation, *Water pollution control, *Waste disposal, Water quality,

Sewage districts, Treatment facilities, Penalties (Legal), Pollution abatement, Adjudication procedure, Legal review, Water quality control, Water quality standards, Legal aspects, Administrative agencies, Law enforcement, Water policy, Sewage, Industrial wastes.

It is Virginia's policy, and the purpose of this law to: (1) protect existing high quality state waters and restore all other state waters so that such waters will permit all reasonable public uses and will support the propagation of all aquatic life; (2) safeguard clean waters from pollution; (3) prevent any increase in pollution; and (4) reduce existing pollution. The right and control of the state in and over all waters within the state is expressly reserved and reaffirmed. The powers and duties of the State Water Control Board, as well as the qualifications of its members, are specified in the legislation. The statute provides for the regulation of industrial establishments and sewage discharges by the Board. The enforcement and appeals procedure of the Board is specified. Any owner aggrieved by a final decision of the Board is entitled to a judicial review of such determination. (Reed-Florida)
W73-06582

WATER SUPPLY ACT OF 1958.
43 U.S.C. secs. 390c thru 390f (1970).

Descriptors: *United States, *Water supply, *Water storage, *Water utilization, *Reservoir storage, Dams, Contracts, Cost allocation, Cost sharing, Legislation, Water law, Water resources development, Dam construction, Financing, Government finance, Water costs, Economics, Governmental interrelations.

Many states and local interests have contracted to pay the federal government for the cost of providing them with water storage space at federal dams and reservoirs. In recognition of the fact that there is no law which defines the duration of such contracts, the Water Supply Act of 1958 is enacted to provide that the contractual right may last as long as the existence of the facility. The Act applies to all dams and reservoirs constructed by the United States where either a part of the construction cost is contributed by states or local interests, or where states or local interests have acquired rights to utilize certain storage space by making payments to the federal government, such payments being equivalent to the cost of providing that part of the facility which is allocated to state or local interest use. Section 390e of the Act provides that the right of continued use is in effect so long as the contract obligations are met and the space designated for state and local interest use is physically available. (Adams-Florida)
W73-06583

BOULDER CANYON PROJECT.
43 U.S.C. secs. 617 thru 617v (1970).

Descriptors: *Colorado River, *Boulder Canyon Project Act, *Reservoir storage, *Colorado River Compact, Dams, Water utilization, Legislation, Dam construction, Federal Government, Water resources development, Water supply, Electric powerplants, Multiple-purpose projects, Flood control, Water storage, Land reclamation, Appropriation, Water rights, Water storage, Land reclamation, Appropriation, Water rights, Water storage, Irrigation, Interstate compacts.

In order to control floods, improve navigation, regulate the flow of the Colorado River, and provide for water storage, reclamation of public lands, and the generation of electricity, the Secretary of the Interior is authorized by the Boulder Canyon Project Act to construct, maintain, and operate a dam in the main stream of the Colorado River. The dam will maintain a storage reservoir of a capacity of not less than twenty million acre-feet of water. Provisions of the Act are subject to the terms of the Colorado River Compact of 1922 which was signed by California, Nevada, Colorado, Arizona, New Mexico, Utah, and Wyoming. Pursuant to said compact, and as a condition precedent to the Boulder Canyon Project, California agrees to consume no more than 4,400,000 acre-feet annually of the waters apportioned to the lower basin states by the compact, nor more than one-half of excess waters unapportioned by the compact. Nevada is authorized by the Act to have an annual use of 300,000 acre-feet of the waters apportioned by the compact, and Arizona is allowed one-half of the surplus waters apportioned under the compact. (Adams-Florida)
W73-06584

COLORADO RIVER STORAGE PROJECT.
43 U.S.C. secs. 620 thru 620o (1970).

Descriptors: *Colorado River Basin, *Colorado River Compact, *River basin development, *Reservoir storage, *Flood control, Legislation, Dams, Reservoirs, River flow, Regulated flow, Water allocation (Policy), Hydroelectric power, Reclamation, Irrigation, Appropriation, Priorities, Municipal water, Cost allocation, Flow control, Water storage, Water supply development, Water distribution (Applied), Diversion, Recreation.

The Colorado River Storage Project is designed to initiate the development of the water resources of the Upper Colorado River Basin for purposes of water storage, regulating the flow of the Colorado River, allowing the Upper Basin states to utilize water apportionments made under the Colorado River Compact, and the generation of hydroelectric power. The Act authorizes the construction of dams, reservoirs, and powerplants at several major project areas. In addition to the primary facilities, the Act also authorizes several reclamation projects and establishes at certain of these projects nonexcess irrigable acreage for which any single ownership may receive project water at 160 acres of class 1 land. In the diversion and storage of water section for any project under authority of this Act for the benefit of Colorado only, 620 c-1 provides that the Secretary of Interior must comply with the law of Colorado relating to priority of appropriation. The total construction cost of each project shall be allocated to power, irrigation, municipal water supply, flood control, navigation, or any other purposes authorized under reclamation law. (Adams-Florida)
W73-06585

GRANTS OF SWAMP AND OVERFLOWED LANDS.
43 U.S.C. secs. 981 thru 994 (1970).

Descriptors: *Swamps, *Wetlands, *Legislation, *Land reclamation, Overflow, Land tenure, Levees, Drainage, Cultivated lands, United States, Federal Government, Economics, Land use, Water rights, Legal aspects, State governments, State jurisdiction.
Identifiers: *Swamp and Overflowed Lands Act, Public Trust Doctrine.

In order that individual states may build necessary levees and drains to reclaim swamp and overflowed lands situated within each state, this statute grants to the several states such swamp and overflowed land. Generally, the Act provides that upon proof that any lands purchased by any person from the United States, prior to March 2, 1855, were swamp lands, that is, lands in which the greater part whereof is wet and unfit for cultivation, the purchase money shall be paid over to the state where the land is situated. This Act does not apply to all states in the same way, moreover, three states--Kansas, Nebraska, and Nevada--are not covered by the Act. Section 989 provides that where Missouri, prior to February 23, 1875, sold swamp lands to settlers who improved the land to a value of $100, the settlers, their heirs and assigns, who have continued to live on the land, shall have priority to homestead all lands rejected by the United States as not being in fact swamps. Also, section 991 confirms title to any confirmed swamp land purchased on or before April 29, 1898, from the state of Arkansas, and makes it valid against any claim of the United States. (Adams-Florida)
W73-06586

COLORADO RIVER BASIN PROJECT.

43 U.S.C. secs. 1501 thru 1528 (1970).

Descriptors: *Water distribution (Applied), *Colorado River Compact, *Colorado River Basin, *Flood control, Eminent domain, Recreation, Navigation, Irrigation water, Municipal water, Water supply, Water flow, Dams, Reservoir storage, Legislation, River basin development, Land reclamation, Water management (Applied), Interstate compacts, Irrigation programs.

The Colorado River Basin Project is established for the comprehensive development of the water resources of the Colorado River Basin. Among the general objectives of the project are flood control, regulation of the flow of the Colorado River, navigation improvement, and provision of basic outdoor recreation facilities. Specifically, the legislation provides for the establishment of the Central Arizona Project which is designed to furnish irrigation water and municipal water supplies to Arizona and New Mexico. The act also permits the federal government to acquire, by purchase or eminent domain proceeding, lands of the Salt River Pima-Maricopa Indian Community and the Fort McDowell-Apache Indian Community necessary for use by the United States for construction of Orme Dam and Reservoir. Additionally, signatories to the Colorado River compact shall be relieved from all obligations which may have been imposed upon them by article III (c) of the Colorado River Compact, subject to approval of the Secretary of Interior. (Adams-Florida)
W73-06587

ST. REGIS PAPER COMPANY V. STATE (NOTICE AS PREREQUISTE TO FINE FOR WATER POLLUTION).
237 So. 2d 797-800 (1st D.C.A. Fla. 1970).

Descriptors: *Florida, *Judicial decisions, *Administrative agencies, *Adjudication procedure, Water pollution control, Oil pollution, Legislation, Water rights, Legal aspects, Damages, Penalties (Legal), Regulation, Law enforcement, State jurisdiction, State governments, Industrial wastes, Water pollution sources, Pulp and paper industry, Legal review.

The Air and Water Pollution Control Commission filed suit against defendant paper company alleging that the defendant had polluted a river by discharging oil, for a period of 47 days, into its waters, in violation of Florida's Air and Water Pollution Control Act. Defendant moved to dismiss the suit on the grounds that the Commission had failed to give notice of the alleged violation. Defendant is appealing from a denial of that motion. The District Court of Appeals noted that the Air and Water Pollution Control Commission is primarily a regulatory agency, with law enforcement a secondary responsibility. The court held that the commission possesses no inherent powers; it is limited to the powers granted, either expressly or by necessary implication, by the statute creating it. Section 403.121 of the Act at issue provides that the Commission must serve written notice of a violation upon alleged violators. The court held that the requirement is a condition precedent to any suit where a continuing violation is charged. Since the defendant had receive no

notice, its motion to dismiss should have been granted; thus, the trial court was reversed. (Adams-Florida)
W73-06588

MATTER OF DERHAM V. DIAMOND (CHALLENGE TO CERTIFICATION GRANTED HYDROELECTRIC FACILITY ON ENVIRONMENTAL GROUNDS).
69 Misc. 2d 1-4 (Sup. Ct. N.Y. 1972).

Descriptors: *Hydroelectric project licensing, *Federal Water Pollution Control Act, *New York, *Thermal pollution, *Water quality standards, Navigable waters, Public health, Heated water, Saline water intrusion, Fish conservation, Electric power industry, Hydroelectric plants, Discharge (Water), Judicial decisions, Legal aspects, Legislation, Permits, Legal review, Administrative decisions.
Identifiers: *Certification, Licenses.

Plaintiff, environmental association, sued to enjoin defendant state agency from certifying construction of a hydroelectric facility. The certification had been granted ostensibly in accord with Sec. 21 of the Federal Water Pollution Control Act which requires an applicant for a federal license to construct facilities resulting in discharge into navigable waters to obtain a certification from the state that such activity will be conducted in a manner which will not violate applicable water quality standards. However, the court found the certification had been granted without proper studies and despite lack of assurance that waters would not be thermally polluted, or fish killed. Though the defendant granted the certification upon the condition that the power company terminate its construction upon evidence of violation of water quality standards, the court found such conditions meaningless, and held the defendant had acted beyond its juriadiction in granting such certification. (Smith-Adam-Florida)
W73-06589

BRYANT V. PEPPE (OWNERSHIP OF LAND CREATED BY AVULSION).

238 So. 2d 836-839 (Fla. 1970).

Descriptors: *Ownership of beds, *Avulsion, *Judicial decisions, *Florida, *Riparian rights, Adverse possession, Equity, Legal aspects, Adjacent landowners, Streambeds, Boundaries (Property), Governments, Streams.
Identifiers: *Estoppel.

Plaintiff landowner brought suit against the defendant state agency to quiet title to a strip of land created by avulsion. The land in controversy was created as a result of a hurricane. Prior to this, the area was sovereignty land adjacent to plaintiff's riparian land. The tax assessor had been taxing the land against plaintiff as waterfront property. Plaintiff claims the land by virtue of his riparian rights, laches, and equitable estoppel. The Florida Supreme Court held that equitable estoppel could not be used to establish title against the state and that the riparian rights doctrine of accretion and reliction did not apply to where the water recedes from the land suddenly. Therefore the court held that title to the sovereignty lands would remain in the state despite avulsion. The decision of the lower court was quashed, and the case remanded for further proceeding not inconsistent with this opinion. (Smith-Adam-Florida)
W73-06590

CITY OF MIAMI V. EASTERN REALTY COMPANY (SEVERABILITY OF RIPARIAN RIGHTS FROM RIPARIAN LAND).

202 So. 2d 760-774 (3d D.C.A. Fla. 1967).

Descriptors: *Florida, *Riparian rights, *Riparian lands, *Ownership of beds, Public access, Legal aspects, Public lands, Public rights, Parks, Dredging, Beds under water, Judicial decisions, Prescriptive rights, Governments.
Identifiers: *Public Trust Doctrine.

Plaintiff, successor in interest to subdividers, brought suit against defendant municipality to quiet title to a fill area adjacent to a park strip. The subdividers had dedicated the park strip, which bordered a bay, to the lot owners in the sub-division. However, for over fifty years the city controlled and maintained the park as if dedicated to the public. Recently, the city had submerged lands adjacent to the park strip filled in. Plaintiff contends he owns the fill area as successor in interest to the subdivider. Defendant claims the park strip and fill area by vitue of prescription and acceptance of the dedication. The Florida District Court of Appeals held that maintenance of the park by the city for so long permitted the inference that the park had been dedicated to and accepted by the city on behalf of the public. Furthermore, where the subdividers did not expressly retain the riparian rights to the park strip, the plaintiffs could have no claim to the adjacent fill area. The court therefore reversed the trial court and ruled that the city held title to the park strip and the adjacent fill area. (Mockler-Florida)
W73-06591

BOROUGH OF NEPTUNE CITY V. BOROUGH OF AVON-BY-THE-SEA (BEACH USER FEES AND THE PUBLIC TRUST DOCTRINE).

61 N.J. 296 (Sup. Ct., New Jersey, 1972). 19 p.

Descriptors: *New Jersey, *Beaches, *Judicial decisions, *Public access, *Public rights, Legal aspects, Local governments, Navigable waters, Public lands, Legislation, Easements, Recreation, Water law, Public benefits.
Identifiers: *Public Trust Doctrine.

Plaintiff municipality challenged the validity of an ordinance enacted by defendant municipality. Defendant's ordinance charged beach user fees for its public beaches; the fees were higher for non-residents than for residents. Plaintiff contended the ordinance violated it common law right of access and the public trust doctrine. The Supreme Court of New Jersey held that municipalities may validly charge reasonable fees for use of their beaches but may not discriminate in any respect between residents and non-residents. The court went on to state that the enactment of a state enabling statute authorizing the municipality to charge beach users fees did not manifest a legislative intent to authorize discrimination in fact. Moreover the court added that where an upland sand area is owned by a municipality and dedicated to public beach purposes, the public trust doctrine dictates that beach and ocean waters must be open to all on equal terms without preference and that any contrary state or municipal action is impermissible; and, that public rights in tidal lands are not limited to ancient prerogatives of navigation and fishing but extend to recreational uses, including bathing, swimming and other shore activities. (Mockler-Florida)
W73-06592

GEWIRTZ V. CITY OF LONG BEACH (MUNICIPAL RESTRICTIONS ON PUBLIC ACCESS TO BEACHES).

69 Misc. 2d 763 (Sup. Ct., N.Y. 1972). 19 p.

Descriptors: *New York, *Beaches, *Judicial decisions, *Public access, *Public rights, Legal aspects, Local governments, Legal review, Easements, Right-of-way, Legislation, Public lands, Prescriptive rights.
Identifiers: *Public Trust Doctrine, Dedication.

Plaintiff private citizen brought suit to restrain the defendant municipality from restricting use of its beaches to residents of the city and their guests only. The city acquired title to its beach front by instruments of conveyance which did not contain restrictions, intending to dedicate the beach and boardwalk to public use as a park by adoption of a local law in 1936. The city thereby accepted the facilities on behalf of the public at large and devoted it to the use of the public at large for over 30 years, until passage of an ordinance restricting use of the beach park to residents and their guests. The Supreme Court of Nassau County held this local law, adopted without legislative authority, invalid insofar as it purported to restrict the use of the park to residents only. The court stated that once a dedication has become complete, it is irrevocable; the city put itself in the position of holding that property subject to a public trust for the benefit of the public at large. Moreover, the court found the city had not been given legislative authority to discontinue use of the beach park for the general public or to change its use. (Mockler-Florida)
W73-06593

INSTITUTIONAL DESIGN AND ENVIRONMENTAL MANAGEMENT; THE TAHOE REGIONAL PLANNING AGENCY,
California Univ., Davis. Inst. of Governmental Affairs.
K. Hanf, and G. Wandersford-Smith.
Institute Research Report No 24, August 1972, 44 p, 53 ref.

Descriptors: *Administration, *Institutions, *Institutional constraints, *Environment, *Management, *Organizations, *Political aspects, *Regional analysis, *California, Planning, Political constraints, Cost analysis, Benefits, Comprehensive planning, Methodology.
Identifiers: *Lake Tahoe Region, *Environmental management, *Institutional design, *Policymaking, Political systems, Policy, Regional planning, Political process.

Some of the reasons why the Tahoe Regional Planning Agency has not lived up to the hopes that environmentalists had for it are considered. An explanation is presented of the performance of the Agency in terms of relationships between its organizational attributes, its politico-administrative environment, and the structure of incentives and constraints in which this and all other attempts at environmental policy-making sets within the context of the political systems must operate. At a more general level, it is argued that environmentalists have scant reason to be either surprised or indignant at the inadequate performance of the intergrated, comprehensive approach to environmental planning. Little systematic attention has been given to the political factors likely to influence the design and performance of the regional agencies or to the political processes which, once set in motion by demands for regional environmental planning, can reasonably be expected to lead to a situation where regional agencies are inadequate to the task at hand. This is not to say that environmental planning is impossible or undesirable in the United States through the medium of regional agencies. However, it is argued that more careful attention must be given to analysis of the costs and benefits of alternative governmental arrangements with a potential for achieving regional environmental planning, including existing as well as proposed arrangements. The nature of environmental planning as a political process must be reconsidered, stressing the need to take clearer account of the consequences of policies advanced in the name of improved environmental quality. (Davis-Chicago)
W73-06614

ABSTRACT OF PROCEEDINGS, HAZARDOUS POLLUTING SUBSTANCES SYMPOSIUM: ANNEX 1 TO STUDY ON CONTROL OF

HAZARDOUS POLLUTING SUBSTANCES HELD AT JUNG HOTEL, NEW ORLEANS, LOUISIANA ON 14-16 SEPTEMBER 1970.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-06654

THERMAL POLLUTION CONTROL IN MASSACHUSETTS COASTAL WATERS,
Massachusetts Water Resources Commission, Boston. Div. of Water Pollution Control.
For primary bibliographic entry see Field 05G.
W73-06688

U.S. AND CANADA AGREE ON ANTI-POLLUTION MEASURES FOR THE GREAT LAKES.
For primary bibliographic entry see Field 05G.
W73-06689

THE PHOSPHATE STORY,
Westchester County Dept. of Health, White Plains, N.Y. Div. of Environmental Health Services.
For primary bibliographic entry see Field 05C.
W73-06749

SOME ASPECTS OF PREDICTING THE SANITARY STATE OF WATER BODIES,
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 05G.
W73-06766

THE GRASS ROOTS AND WATER RESOURCES MANAGEMENT.
Washington State Water Research Center, Pullman.

Report No 10, 1972. 156 p. (edited by Linda McKenzie). OWRR A-999-WASH (5).

Descriptors: *Water resources development, *Resources development, Planning, Evaluation, State governments, Federal government, Conferences, *Washington.
Identifiers: *Public participation, *Workshops, Recommendations.

Eighteen conference participants presented papers on the general topic of public participation in the resource development planning process. Thirteen of these papers were delivered as panel discussions. Papers presented as the panel on 'A Case Study: Puget Sound and Adjacent Waters' included: (1) an evaluation of public involvement in the Puget Sound and Adjacent Waters Study, (2) two papers on recommendations for improving the grass roots response, (3) three papers appraising the experience of the King County Workshop on the Puget Sound Study, and (4) a discussion of the community workshop as an experiment in public involvement. The panel on 'Public Involvement Programs of Federal Agencies' included papers on the roles of the water resource planner, the Corps of Engineers, and the Bureau of Reclamation. The panel on 'Public Involvement Programs of Federal Agencies: Wild, Scenic, and Recreational Rivers Program' provide viewpoints from the State of Washington, the Forest Service, and the Bureau of Outdoor Recreation. The remaining papers discussed (1) public involvement at the grass roots level, (2) water as a social object, (3) public participation in developing the Rogue River Basin, (4) lessons in public education, and (5) the role of the concerned citizen. (See W73-06852 thru W73-06857) (Settle-Wisconsin)
W73-06851

A CASE STUDY: PUGET SOUND AND ADJACENT WATERS.

In: The Grass Roots and Water Resources Management, State of Washington Water Research Center, Pullman, Report No 10, 1972, p 11-47.

Descriptors: *Water resources development, *Resources development, Conferences, Planning, *Washington.
Identifiers: *Resource management, *Public participation, *Puget Sound (Wash).

Eight panelists discuss the lessons learned from the public's participation in the planning of the Puget Sound and Adjacent Waters Project. The chairman of the Puget Sound and Adjacent Waters Study evaluates public involvement in the Puget Sound Study. The Study's experience suggests that grass roots input is necessary for the preparation of meaningful comprehensive plans which can be both understood and supported by the public. Obtaining optimum benefits from grass roots participation requires the representation of well-balanced public viewpoints. Representatives from the Washington Environmental Council and the Puget Sound League of Women Voters discuss the grass roots response to the Puget Sound Study. The three co-chairmen of the King County Workshop on the Puget Sound Study provide an appraisal of the workshop process. Finally, a member of the Washington State Department of Ecology evaluates the community workshop as an experiment in public involvement. In general, the panelists thought that public participation in the planning process improved the resource development plan. However, since public involvement is relatively new, little expertise in public participation programs exists so numerous problems were encountered in the Puget Sound Study. Recommendations for avoiding these problems are provided. (See also W73-06851) (Settle-Washington)
W73-06852

PUBLIC INVOLVEMENT PROGRAMS OF FEDERAL AGENCIES.

In: The Grass Roots and Water Resources Management, State of Washington Water Research Center, Pullman, Report No 10, 1972, p 55-95. 6 ref.

Descriptors: *Water resources development, *Planning, *Federal government, State governments, Local governments, Communication, Conferences.
Identifiers: *Resource management, *Public participation, Agencies, Workshops.

Three panelists discuss the role of public participation programs in federal agencies. David Allee of the New York State College of Agriculture and Life Sciences examines the changing role of the water resource planner. The particular sub-topics discussed include: (1) satisfying local needs through national action, (2) conflict created by changes in program opposition or support, (3) agency response to program opposition, and (4) the natural resource planner's role in resolving opposition and conflict. Richard Sellevold of the Seattle District Corps. of Engineers relates the Corps' experience with public involvement programs. The Corps' experience suggests that such programs should (1) allow the public to establish goals and priorities, (2) permit public participation in the development of alternatives, (3) allow open public debate of conflicting views, (4) encourage two-way communication between the planner and the citizenry, (5) demonstrate how public participation affected the proposed program, and (6) above all, keep the public involved from beginning to end. The key to the Corps' approach is a public brochure, a summary document of the results of studies to date. Warren Fairchild of the Bureau of Reclamation discusses the Bureau's experience with public participation programs. (See also W73-06851) (Settle-Wisconsin)
W73-06853

PUBLIC INVOLVEMENT PROGRAMS OF FEDERAL AGENCIES: WILD, SCENIC, AND RECREATIONAL RIVERS PROGRAM.

In: The Grass Roots and Water Resources Management, State of Washington Water Research Center, Pullman, Report No 10, 1972, p 97-115.

Descriptors: *Water resources development, *Planning, Management, State governments, *Federal government, Conferences.
Identifiers: *Resources management, *Public participation, Citizen involvement, Agency, Workshops.

A panel discussion presents three viewpoints on public participation in resource management planning. A state viewpoint is provided by the coordinator for the Washington State Interagency Committee for Outdoor Recreation; federal agency viewpoints are provided by representatives from the Forest Service and Bureau of Outdoor Recreation. The state representative suggests that one of the major problems in involving the public is that state agencies have not traditionally had much contact with the public at the intermediate and long-range planning levels. Consequently, most state and federal resource management officials have little, if any, expertise in working directly with the public. One solution to this problem may be to use professional staff, who are already working directly with the public, as much as possible when initiating public participation programs. The Forest Service's representative discusses the Service's methods of determining public preferences and securing public involvement in the Wild and Scenic Rivers program. The Service obtains public participation primarily through broadly-based steering committees and public meetings. The representative of the Bureau of Outdoor Recreation comments on the Bureau experience with public involvement and provides a list of suggestions about how to obtain public involvement. (See also W73-06851) (Settle-Wisconsin)
W73-06854

THE ROGUE RIVER BASIN STORY,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
M. Karr.
In: The Grass Roots and Water Resources Management, State of Washington Water Research Center, Pullman, Report No 10, 1972, p 117-125. 2 ref.

Descriptors: *Water resources development, *Planning, Resources development, *Local governments, *Federal government, *Oregon, Conferences.
Identifiers: *Public participation, *Local support, Resource management, *Rogue River (Oregon), Workshops.

The case history of the Lewis Creek Dam in Oregon's Rogue River Basin illustrates the advantages of involving the public in the water resources planning process. When the dam was originally proposed in 1948, little attention was given to public involvement. Strong local opposition to the project developed, and as a result Congress declined to authorize the project even though the benefit-cost ratio was acceptable. In 1957, the Oregon State Legislature charged the State Water Resources Board with encouraging, promoting, and securing the maximum beneficial use and control of the Basin's water resources. This time, however, an effort was made to involve the public as direct participants throughout the planning and decision-making process. Water Resources Ad-

visory Committees were formed to serve in an advisory capacity to local governments and to the State Board. Sub-committees were also formed to study water uses and control. The sub-committees' reports clearly identified the local viewpoint and greatly influenced the final state policy position on the Basin. This attention to local interests generated strong public support for the dam. The local unity was, no doubt, instrumental in obtaining final Congressional authorization for the project. (See also W73-06851) (Settle-Wisconsin)
W73-06855

LESSONS IN PUBLIC EDUCATION,
Washington State Univ., Pullman. Cooperative Extension Service.
J. C. Barron.
In: The Grass Roots and Water Resources Management, State of Washington Water Research Center, Pullman, Report No 10, 1972, p 127-133. 1 ref.

Descriptors: *Resources development, *Water resources development, *Education, Planning.
Identifiers: *Public participation, Resource management, Adult education, Agencies.

The role that adult education can play in water planning is discussed. First, the importance of public education grows as the public's interest in public affairs increases. Second, educational efforts must be appropriate to their audience. A group concerned with flood control will not be too susceptible to learning about pollution abatement. Third, teamwork is an important adjunct to a successful educational program. Few issues can be completely covered by one individual or by one particular subject-matter area. Water issues in particular cover a wide variety of subject-matter areas. Fourth, education should take a systems approach to public affairs issues rather than focusing on such specific identifiable segments as irrigation, flood control, power production, fish enhancement, and recreation. Fifth, public agencies must deal with educational programs related to resource use and development. These programs require an educational leadership which many public agencies are ill-equipped to provide. Sixth, educational programs should provide for free discussion and interchange of ideas and alternative program formulations rather than serve as an official propaganda instruments. Seventh, public agencies should present all of the alternative solutions to a particular problem. (See also W73-06851) (Settle-Wisconsin)
W73-06856

THE ROLE OF THE CONCERNED CITIZEN,
Washington State Soil and Water Conservation Committee, Olympia.
W. H. Schmidtman.
In: The Grass Roots and Water Resources Management, State of Washington Water Research Center, Pullman, Report No 10, 1972, p 135-151.

Descriptors: *Resources development, *Planning, Land use, Land management.
Identifiers: *Resource management, *Public participation, Citizen involvement, Land users, Nonland users.

The resource management planner is apt to encounter several problems as he seeks citizen involvement in plan formulation. First, he must arouse the concern of the citizen, that is, get his attention. Frequently this effort, if it is to be successful, requires some drastic action. Once the citizen's concern is aroused, the second part of the problem is to organize that concern for effective expression and action. People tend to become aroused about issues when they are personally affected, so they are most easily reached if they can be convinced that the planning which must be done will affect them personally. Also, people tend to distrust authority and resent regulation in any form. Consequently, it is best to work with community leaders of local organizations and elected officials of local governments to establish the original dialogue. The public can be divided into land users and non-land users. Land users consist of such groups as farmers, land developers, industry, and recreational interests. Frequently, non-land users provide innovative ideas for improving the status quo, while land users serve as effective stabilizers on many revolutionary ideas. Thus, it is important to include both groups in the planning process. (See also W73-06851) (Settle-Wisconsin)
W73-06857

INTEREST GROUPS, INTERGOVERNMENTAL RELATIONS, AND THE ENVIRONMENT: A STUDY OF HOW A $200 MILLION INDUSTRIAL COMPLEX WAS PREVENTED IN SOUTH CAROLINA,
Florida State Univ., Tallahassee. Dept. of Government.
H. E. Albert.
Ph. D. Dissertation, June 1972. 351 p, 10 fig, 10 tab, 114 ref, 1 append. OWRR B-034-SC (5).

Descriptors: *Industrial wastes, *Chemicals, *Chemical wastes, Industries, Environmental effects, Communication, State governments, Federal government, Pollution abatement, *South Carolina.
Identifiers: *Industrial development, Intergovernmental relations, Interest groups.

In 1969, South Carolina public officials announced that Badische Anilin und Soda Fabrik (BASF) planned to build a large chemical plant at Victoria Bluff, South Carolina. As the public became increasingly alarmed at the proposed petro-chemical plant's potential for environmental degradation, opposition to the BASF plant formed and a governmental-private sector conflict developed. This conflict is reconstructed from files, public records, and interviews in order to discover (1) the points of contact between the private sector and various levels of government; (2) intergovernmental and inter-agency relations; (3) interest group methods of obtaining support from a particular government or agency; and (4) possible breakdowns of communication both between governmental agencies and between these agencies and the private sector. The private sector's opposition to BASF took three forms: (1) an intensive environmentally-oriented publicity campaign, (2) intensive lobbying with federal officials, and (3) use of the courts to delay and harass BASF and South Carolina public officials. The study suggests that most conflict could have been avoided had state officials shown greater concern for sincere communication with citizens. Alternative structural arrangements for the state government are proposed. (Settle-Wisconsin)
W73-06858

PUBLIC WORKSHOPS ON THE PUGET SOUND AND ADJACENT WATERS STUDY: AN EVALUATION,
For primary bibliographic entry see Field 06B.
W73-06861

WATER RESOURCES IN THE LAKE TAHOE REGION.
Tahoe Regional Planning Agency, South Lake Tahoe, Calif. Committee on Water Distribution.

May 1971. 16 p, 7 ref.

Descriptors: *Water allocation (Policy), *Legal aspects, *Interstate compacts, *Competing uses, Water policy, Water needs, *California, *Nevada, Water resources, Water utilization, Projections, Water rights, Water contracts.
Identifiers: *Lake Tahoe, *Truckee River.

An overall view of the water resource in the Lake Tahoe Region is presented. This region includes Lake Tahoe and its outlet, the Truckee River. A history is presented of the various claims and uses of the Lake Tahoe water. The operating policies for the Lake Tahoe discharge gates as developed over the last 60 years are described. Because the region spans two states, California and Nevada, a discussion of the California-Nevada Interstate Compact is presented together with Nevada State Water policy and current divisions and uses of the Lake Tahoe water in both California and Nevada. Finally, future needs in the region are examined. (Davis-Chicago)
W73-06907

WATER QUALITY AFTER A DISASTER,
Los Angeles Dept. of Water and Power, Calif.
For primary bibliographic entry see Field 05B.
W73-06910

FLOOD LOSSES - WILL THEY EVER STOP.,
Johns Hopkins Univ., Baltimore, Md.
S. H. Hanke.
Journal of Soil and Water Conservation, Vol 27, No 6, p 242-243, November-December 1972.

Descriptors: *Flood damage, *Flood control, *Flood protection, *Social aspects, *Cost analysis, Flood plains, Urbanization, Flood plain insurance, Cost sharing, Political aspects, Institutional aspects.
Identifiers: Flood plains development, Subsidies, Flood control policy.

Emphasis is placed on the continuing increase in flood losses in spite of large expenditures for flood protection. Average flood damages now equal the average amount spent to prevent them. Every six dollars of potential flood damage presvented by new flood controls, is offset by five dollars of actual damages to new development on the 'protected' flood plains. Several questions are explored in depth. Why do people persist in developing the floodplain. Why are flood losses so high despite the large expenditures for protection. How can flood damages be reduced. It is concluded that efficient reduction of flood losses can be accomplished through mandatory insurance, local cost-sharing, and elimination of subsidies. However, it is felt that political and institutional realities are formidable obstacles to implementing effective flood-control policy. (Davis-Chicago)
W73-06928

CALIFORNIA'S OCEAN RELATED NEEDS, A STUDY TO DETERMINE THE OCEAN RELATED NEEDS AND TO IDENTIFY PROGRAMS TO MEET THE NEEDS,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 06B.
W73-07043

6F. Nonstructural Alternatives

FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES.
Water Resources Council, Washington, D.C.

Available from the National Technical Information Service as PB-210 850, $3.00 in paper copy, $0.95 in microfiche. May 1972. 22 p, 3 fig.

Descriptors: *Flood plains, *Flood control, *Federal project policy, *Flood damage, Water control, Water management (Applied), Watershed management, Flood protection, Project planning, Administrative decisions, Flood plain zoning, Non-structural alternatives, Coastal plains, Land management, Floods.

A comprehensive guide to flood hazard evaluation is presented for federal executive agencies. It provides for combining flood prevention and control techniques with other management elements in a unified national program of flood-plain management. The document serves as an implementation of Executive Order 11296 which expressed the concern of the federal government over mounting flood losses in the United States and required that the flood hazard be evaluated by all federal executive agencies in the planning and construction of new federal facilities, in modifying existing federal facilities, in disposing of federal lands or properties, and in carrying out programs involving land use planning. Guidelines for implementation are specifically spelled out. In addition, comprehensive information on floodplains, riverine floodplains, coastal floodplains, debris cone floodplains, evaluation of a flood hazard, and the approach to be followed are given. Meeting the objectives of the Executive Order means that if suitable non-floodplain sites are available for a proposed development or use, then floodplain sites should be avoided unless they can be adequately protected. (Mockler-Florida)
W73-06576

PRELIMINARY DETAILED PLANS FOR SPOKANE RIVERFRONT DEVELOPMENT.
Spokane County Planning Commission, Wash.

Spokane Riverfront Plan, Report No 16, Study Phase II, June 1969, 35 p, 11 fig, 3 photo, append.

Descriptors: *City planning, *Land development, *Urbanization, Land use, Railroads, Planning, Aesthetics, *Washington.
Identifiers: *Spokane (Wash), *Riverfront development.

Results are presented of the second of a three phase program to improve the Spokane riverfront. The overall study objective was a coordinated plan to enhance and guide development of public and private land along the riverfront. The plan had to be flexible in terms of dealing with extensive railroad land along the river, so that it was workable no matter how little or how much of the railroad riverfront land becomes available for use other than railyards. The preliminary detailed plans for this study and descriptions of 31 separate but interrelated proposals for development of the Spokane Riverfront are included. (Davis-Chicago)
W73-06922

6G. Ecologic Impact of Water Development

ECOLOGICAL IMPACT OF SURFACE WATER IMPOUNDMENTS IN THE GREAT PLAINS AREA,
Nebraska Univ., Lincoln. Water Resources Research Inst.
C. M. Cowan.
Available from the National Technical Information Service as PB-217 882, $4.50 in paper copy, $0.95 in microfiche. Nebraska Water Resources Research Institute, Lincoln, Project Completion Report, October 1972. 46 p, 2 tab, 2 ref, append. OWRR B-010-NEB (1). 14-31-0001-3302.

Descriptors: Impoundments, Ecology, *Probability, *Environment, Statistical methods, *Evaluation, Water demand, *Habitats, Recreation, Agriculture.
Identifiers: *Ecological impact, *Platte River.

The proposed location of the Corps of Engineers Platte River Dam was analyzed from the standpoint of its environmental impact. A technique was developed which offers an objective approach to environmental analysis and an alternative to the more subjective cost-benefit ratio. The philosophy behind the method is founded on statements of relative truth while the actual technique is based on the probabilities of occurrence of resources and the desires or demands for the resources. The application of the method to the Platte Dam using the categories of Agriculture, Recreation, Bird Habitat, Mammal Habitat and Fish Habitat indicated that, from the standpoint of the aforementioned cateogories, the Platte Dam would have been feasible assuming optimum water levels were maintained. The Agriculture and Mammal Habitat categories scored in favor of the present river system, while the other three categories favored the proposed lake.
W73-06528

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION V. U.S. POSTAL SERVICE (SUIT TO ENJOIN CONSTRUCTION UNTIL FILING OF ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 06E.
W73-06567

MAINTENANCE DREDGING, ANDREWS RIVER, MASSACHUSETTS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08B.
W73-06577

COMPREHENSIVE BASIN STUDY, BIG MUDDY RIVER, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 04A.
W73-06578

ENVIRONMENTAL IMPACT AND WATER DEVELOPMENT,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 05G.
W73-06606

INSTITUTIONAL DESIGN AND ENVIRONMENTAL MANAGEMENT; THE TAHOE REGIONAL PLANNING AGENCY,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 06E.
W73-06614

SUMMARY OF THE DRAFT ENVIRONMENTAL ASSESSMENT, POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY.
VTN, Las Vegas, Nev.
For primary bibliographic entry see Field 05D.
W73-06616

DESIGN VERSUS ECOLOGY IN ST. JOHNS AND INDIAN RIVERS,
Reynolds, Smith and Hills, Jacksonville, Fla.
For primary bibliographic entry see Field 05C.
W73-06692

U.S. DEEPWATER PORT STUDY--SUMMARY AND CONCLUSIONS.
Robert R. Nathan Associates, Inc, Washington, DC.
For primary bibliographic entry see Field 08A.
W73-06711

ECOLOGICAL IMPACT OF WATER RESOURCE DEVELOPMENT--A TECHNICAL SESSION OF THE SYMPOSIUM, 'WATER, MAN, AND NATURE'.
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 05G.
W73-06847

INTEREST GROUPS, INTERGOVERNMENTAL RELATIONS, AND THE ENVIRONMENT: A STUDY OF HOW A $200 MILLION INDUSTRIAL COMPLEX WAS PREVENTED IN SOUTH CAROLINA,
Florida State Univ., Tallahassee. Dept. of Government.
For primary bibliographic entry see Field 06E.
W73-06858

THE CHRISTINA PROJECT: ENVIRONMENTAL PROTECTION IN URBAN GROWTH AREAS,
Delaware Univ., Newark. Water Resources Center.
J. Tourbier.
Urban Land, Vol 31, No 8, p 14-20, September 1972. 8 fig. OWRR A-016-DEL (2).

Descriptors: *Environmental control, *Urbanization, *Cities, *City planning, *Community development, Environmental impact, Analytic techniques, Waste treatment, Runoff, Construction, Computer models, Cost analysis, Alternative planning, *Delaware.
Identifiers: *Environmental protection, *Urban development, Impermeable surfaces, Map overlays, Probability trees, *Christina River.

The growing complexity of environmental issues makes it difficult for developers to assess the environmental impact of their projects and then see feasible alternatives and guidelines that can be followed. Without a national system of analysis, the conflict between conservationist and developer will continue with the public official caught in the middle. Some of the techniques employed by the Christina River Basin, Delaware to deal with these problems are described. These include map overlay-transparencies of land types needing protection, probability trees for determining site class combinations, and computer techniques for revealing spatial distribution of costs. Urban development is discussed in terms of three basic environmental problems which it causes: (1) the removal of vegetation and earthmoving during construction; (2) the increase in the area of impermeable (paved) surfaces, and (3) the increase in the area of wastes requiring treatment. More work needs to be done to specify environmental protection measures, assess their effectiveness, and calculate their costs. (Davis-Chicago)
W73-06864

PORT ROYAL SOUND ENVIRONMENTAL STUDY.
South Carolina Water Resources Commission, Columbia.
For primary bibliographic entry see Field 05B.
W73-07057

07. RESOURCES DATA

7B. Data Acquisition

MEASUREMENT OF SOIL MOISTURE BY ATTENUATION OF A VERTICALLY POLARIZED RADIO WAVE,
Utah State Univ., Logan.
For primary bibliographic entry see Field 02G.
W73-06532

PRESENT METHODS FOR STUDYING THE CONDITION OF WATER AND MOLECULAR MECHANISMS OF WATER EXCHANGE IN PLANT CELLS (IN RUSSIAN),
Kazan Inst. of Biology (USSR).
For primary bibliographic entry see Field 02I.
W73-06611

SURFACE CURRENT MEASUREMENTS BY EXPENDABLE PROBES,
Coast Guard, Washington, D.C., Office of Research and Development.
S. Broida, and W. S. Richardson.
Available from the National Technical Information Service as AD-743 706, $3.00 in paper copy, $0.95 in microfiche. Technical Report, June 1972. 7 p, 2 fig, 3 ref. Project No. 726520. Contract No. DOT-CG-20,859A.

Descriptors: *Currents (Water), *Mechanical equipment, *Drifting (Aquatic).

An expendable probe for making measurements of surface currents and directions consists of six basic parts: a weighted nose cone, a clock (a kitchen timer), two floats that rise from the bottom when released by the clock, the surface marker, and a protective outer tube. When the probe is dropped from an airplane the surface marker is separated and floats to the surface. The remainder of the probe settles to the bottom and releases two floats after predetermined time delays between them. These floats emit fluorescein dyes at the surface. Surface current and direction can be calculated from the known time delay and the distance between floats. One possible use of the equipment is in determining bulk movement of spilled materials. (Little-Battelle)
W73-06630

SOME CHARACTERISTICS OF SEVERAL COMMERCIALLY AVAILABLE CATION-RESPONSIVE GLASS ELECTRODES,
Adelaide Univ. (Australia). Dept. of Physical and Inorganic Chemistry.
For primary bibliographic entry see Field 02K.
W73-06665

EFFECT OF DEAD VOLUME ON EFFICIENCY OF A GAS CHROMATOGRAPHIC SYSTEM,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W73-06679

BEHAVIORAL THERMOREGULATION BY FISHES: A NEW EXPERIMENTAL APPROACH,
National Marine Fisheries Service, Honolulu, Hawaii. Southwest Fisheries Center.
W. H. Neill, J. J. Magnuson, and G. G. Chipman.
Science, Vol 176, No 4042, p 1443-1445, June 30, 1972. 2 fig, 10 ref.

Descriptors: *Fish, *Temperature, *Laboratory tests, Laboratory animals, Cooling, Animal physiology, Behavior, *Thermal pollution, Pathology, Water pollution effects.
Identifiers: *Thermoregulatory performances.

Electronic equipment allows fishes, by their spatial movements, to regulate the temperature in experimental tanks. Swimming into warmer water causes the temperature of the entire tank to increase; conversely, swimming into cooler water causes the temperature to decrease. The technique may be adapted for studying simultaneous behavioral regulation of temperature and nonthermal factors. (Oleszkiewicz-Vanderbilt)
W73-06687

SOME OBSERVATIONS OF TEMPERATURE FLUCTUATIONS IN THE COASTAL REGION OF THE BALTIC,
Swedish Natural Science Research Council, Stockholm (Sweden).
G. Walin.
Tellus, Vol 24, No 3, p 187-198, 1972. 14 fig, 5 ref.

Descriptors: *Coasts, *Thermocline, *Waves, Hydrodynamics, Hydrographs, Ocean currents, Isotherms, Stratification, Thermometers, Sounding, Temperature, Winds, Mixing.
Identifiers: Kelvin waves, Thermistor, *Baltic Sea.

Observations of Baltic temperatures in an area southwards on the Swedish east coast were taken on an almost daily basis during July and August 1968. These readings were obtained with a simple thermistor and pressure gauge mechanism in order to produce temperature profiles at different distances from the coast. It is speculated that the large amplitude temperature variations found in the area from 5-10 km from the coast are propagated as internal Kelvin waves. The data obtained generally agreed with theoretical expectations. (Jerome-Vanderbilt)
W73-06698

AN AUTOMATIC SAMPLER FOR EFFLUENTS,
For primary bibliographic entry see Field 05A.
W73-06780

DETERMINATION OF COARSE-SEDIMENT GRAIN-SIZE DISTRIBUTION (OTSENKA GRANULOMETRICHESKOGO SOSTAVA KRUPNYKH NANOSOV),
For primary bibliographic entry see Field 02J.
W73-06805

REMOTE SENSING OF WATER QUALITY,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-06809

ON DETERMINING THE MELTED WATER CONTENT OF SNOW BY DIELECTRIC MEASUREMENTS,
Innsbruck Univ. (Austria). Dept. of Physics.
For primary bibliographic entry see Field 02C.
W73-06818

MICROWAVE RADIOMETRIC OBSERVATIONS OF SIMULATED SEA SURFACE CONDITIONS,
North American Rockwell Corp., Thousand Oaks, Calif. Science Center.
M. J. Van Melle, H. H. Wang, and W. F. Hall.
Journal of Geophysical Research, Vol 78, No 6, p 969-976, February 20, 1973. 4 fig, 2 tab, 10 ref. NASA Contract NAS-1-10106.

Descriptors: *Water temperature, Water pollution sources, *Remote sensing, *Microwaves, Laboratory tests, Oil spills, Sea water, Salinity, Radar, Model studies, Waves (Water).
Identifiers: *Sea surface properties.

Various factors affect the surface properties of the ocean as seen by a passive microwave radiometer operating at 2.66 GHz. The principal uncertainties in the absolute measurements of the thermal emissions from the sea in terms of molecular temperature stem from (1) surface contaminations, such as oil slicks, (2) spray and foam, (3) salinity variation, and (4) surface waves. The direct contribution of surface films and spray to the thermal emission from the sea is considerably less significant than that of foam and waves. In particular, oil slicks appear to contribute about 1 deg per mm of their thickness to the apparent brightness temperature, and spray gives a negligible contribution for the droplet concentrations generally expected near the sea surface. Salinity variations can generate a significant uncertainty in radiometric measurements if they are not accounted for. The contribution of waves to the brightness temperature may be substantially higher than would be expected from theory based on the tangent plane approximation. Limited experiments on the influence of simulated foam suggest that this effect may be less than that of surface waves. (Knapp-USGS)
W73-06826

USE OF SATELLITES IN COASTAL ENGINEERING,
Army Engineer District, San Francisco, Calng, O. T. Magoon, J. W. Jarman, and D. W. Berg.
Army Coastal Engineering Research Center Reprint 4-72, August 1971. 22 p, 7 fig. (Reprinted from 1st International Conference on Port and Ocean Engineering under Arctic Conditions, Vol 2, p 1234-1255, 1971).

Descriptors: *Data collections, *Coastal engineering, *Satellites (Artificial), *Remote sensing, *Aerial photography, Infrared radiation, Shores, Engineering structures, Design criteria, Shore protection, Shoreline cover, Ocean waves, Ocean currents, Sediment transport.

Unmanned satellites are discussed as a means of data collections in coastal engineering and coastal processes by providing satellite imagery of desired locations over an extended period of time. In many areas of the world, important coastal features are known to various coastal laboratories and stations. A cooperative program to study or observe these areas by obtaining satellite images of those areas where an ongoing sea-truth program is available may provide a means of improving our understanding of basic coastal processes. In these instances, the funding of the image interpretation would be the responsibility of each cooperative organization but the acquisition of the remotely sensed data could, within the constraints of the system, be obtained by the U.S. National Aeronautics and Space Administration. (Woodard-USGS)
W73-06838

CARTESIAN DIVER MICRORESPIROMETRY FOR AQUATIC ANIMALS,
Polish Academy of Sciences, Warsaw. Inst. of Experimental Biology.
R. Z. Kiekowski.
Pol Arch Hydrobiol, Vol 18, No 1, p 93-114, 1971, Illus.
Identifiers: *Aquatic animals, *Cartesian Diver technique, Ecological energetics, Physiology, *Respirometry.

A respirometric technique is investigated, with the use of Zeuthen's stoppered divers, mainly for purposes of ecological physiology and ecological bioenergetics. The complete apparatus and accessory equipment, the manner of making Cartesian divers for measuring O2-consumption and CO2-output and the course of determination of both these processes are discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-06913

LIQUID SCINTILLIATION COUNTING: SAMPLE PREPARATION TECHNIQUES FOR ORGANIC MATERIALS,
Nuclear Enterprises Ltd., Edinburgh (Scotland).
For primary bibliographic entry see Field 05A.
W73-06943

MANUAL FOR THE STUDY OF THE PROPERTIES OF ICE,
For primary bibliographic entry see Field 02C.
W73-06949

FIELD CALIBRATION AND EVALUATION OF A NUCLEAR SEDIMENT GAGE,
Agricultural Research Service, Chickasha, Okla. Southern Great Plains Watershed Research Center.
For primary bibliographic entry see Field 02J.
W73-06975

DYNAMIC SURFACE TEMPERATURE STRUCTURE OF THERMAL PLUMES,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 05B.

W73-06976

FIRST RESULTS OF OBSERVATIONS IN AN OPEN-CYLINDER LYSIMETER (PERVYYE ITOGI NABLYUDENIY V OTKRYTOM LYSIMETER),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 02G.
W73-06988

INSTRUMENTATION FOR DAMS,
Shannon and Wilson, Inc., Seattle, Wash.
For primary bibliographic entry see Field 08D.
W73-06992

EVALUATION OF PHOTOGRAMMETRIC CROSS SECTIONS FOR EARTHWORK PAYMENT,
Wisconsin Dept. of Transportation.
For primary bibliographic entry see Field 08D.
W73-06994

SPECTROPHOTOMETRIC DETERMINATION OF CHROMIUM WITH XYLENOL ORANGE AND METHYLTHYMOL BLUE,
Missouri Univ., Kansas City. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W73-07028

RADIATIVE TEMPERATURES IN THE WILLAMETTE VALLEY,
Oregon State Univ., Corvallis. School of Forestry.
L. W. Gay.
Northwest Science, Vol 46, No 4, p 332-335, 1972. 1 tab, 8 ref. OWRR A-010-ORE (6).

Descriptors: Radiation, *Temperature, Surfaces, *Heat budget, *Solar radiation, Evaporation, *Remote sensing, Analytical techniques, *Oregon.
Identifiers: *Willamette Valley (Ore).

An aerial survey of various surfaces was made with an infrared thermometer under cloudless skies. The temperatures reported can be compared readily because uniform weather conditions prevailed during the midday period of the measurements. The temperatures also may be referenced against a screen air temperature of about 35 C. In general, vegetation remained near or somewhat below screen temperature, but nonvegetated surfaces rose considerably above. The differences are related to the relative efficiencies with which the surfaces partition absorbed solar radiation into re-radiation, storage, convection, and evaporation. The availability of water for evaporation plays a major role in establishing the equilibrium temperature of a surface. Information on equilibrium temperatures contributes to a better understanding of the thermal response of irradiated natural surfaces.
W73-07031

ROTATING FLUID STUDIES WITH RELEVANCE TO GEOPHYSICS,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 02E.
W73-07033

CLOUD PHOTOGRAPHS FROM SATELLITES AS A HYDROLOGICAL TOOL IN REMOTE EQUATORIAL REGIONS,
Wisconsin Univ., Madison. Dept. of Meteorology.
R. C. Grosh, J. A. Weinman, and C. W. Van Scherpenzeel.
Journal of Hydrology, Vol 18, No 2, p 147-161, February 1973. 8 fig, 11 ref.

Descriptors: *Aerial photography, *Clouds, *Rainfall, *Flood forecasting, *Satellites (Artificial), Surveys, Remote sensing, Mapping, Data collections, Tropical regions, Wet climates, Meteorology, Meteorological data, Instrumentation, Runoff forecasting.
Identifiers: *Surinam.

The area of bright clouds in pictures obtained from satellites is approximately proportional to the stream runoff below the cloud system if nocturnal storms are insignificant. Criteria and circuitry to objectively determine cloud areas are presented. This type of information can provide flood warning data in remote tropical areas where it may be difficult to obtain other measurements of rainfall. (Knapp-USGS)
W73-07046

THE EDDY-CORRELATION TECHNIQUE OF EVAPORATION MEASUREMENT USING A SENSITIZED QUARTZ-CRYSTAL HYGROMETER,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Meteorological Physics.
For primary bibliographic entry see Field 02D.
W73-07130

SOIL SURFACE WATER DEPLETION AND LEAF TEMPERATURE,
Texas A and M Univ., College Station. Remote Sensing Center.
A. R. Aston, and C. H. M. VanBavel.
Agronomy Journal, Vol 64, p 368-373. May-June 1972, 7 fig, 7 ref.

Descriptors: *Soil temperature, *Surface waters, *Environmental effects, *Drying, *Soil environment, *Thermal radiation, Leaves, Agronomy, Crop production, Soil investigations, Analytical techniques, Energy budget, Soil-water-plant relationships, Evapotranspiration, Soil surfaces, Crop response, Thermal stress, Microenvironment, Standing waters, Plant physiology, Water loss, Remote sensing.
Identifiers: Leaf energy budget.

In any attempt to arrive at a useful application of remote sensing techniques in agricultural crop production, a particular radiance or radiance pattern must be uniquely related to a condition of interest in the soil-crop system. This work explores the feasibility of the remote detection of water depletion in a cropped field. It proposes that this may be accomplished by detecting the increase in the visible and thermal radiant heat loads upon plant leaves when the underlying soil surface dries. A theoretical model was constructed, relating leaf temperature to soil surface temperature. Parallel experiments were done using a grey podzolic soil. In spite of an increase of 15 percent in reflectivity upon drying, there was an increase in soil surface temperature from 20 to 50 C. The increased shortwave and longwave radiant loads on leaf arrays in the experiments resulted in leaf temperature increases of 2.5, 0.5, and 2 C in dry blotting paper, wet blotting paper, and leaves of the southern pea (Vigna sinensis), respectively. The leaf energy balance-soil water depletion model predicted these increases, as well as the absolute temperature, with an accuracy of 1 and 5 percent for the artificial and real leaves, respectively. Findings affirm that a technology can be developed for the remote detection of soil water depletion in field crops, but that the temperature differences involved are both small and variable. (Black-Arizona)
W73-07131

7C. Evaluation, Processing and Publication

OPERATIONAL CHARACTERISTICS OF A NUMERICAL SOLUTION FOR THE SIMULATION OF OPEN CHANNEL FLOW,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources.
For primary bibliographic entry see Field 02E.
W73-06504

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS VOLUME V: A METHOD OF DATA REDUCTION FOR WATER RESOURCES INFORMATION STORAGE AND RETRIEVAL,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
K. L. Lewinger.
Available from the National Technical Information Service as PB-217 862, $4.50 in paper copy, $0.95 in microfiche. Water Resources and Marine Sciences Center Technical Report No. 51, October, 1972. 65 p, 12 fig, 2 tab, 45 ref, 3 append. OWRR C-3101 (3684) (1).

Descriptors: *Data storage and retrieval, *Data collection, Hydrology, *Operating costs, Economics, *Least squares method, *Linear programming, Computer programs, Analysis, Management, Hydrologic aspects, Hydrographs, Methodology, Marginal costs, Benefits, Model studies, Water quality, Water quantity.
Identifiers: *Data reduction.

Data storage and retrieval expenses represent a significant portion of the cost of operating a management information system. This study focuses on the question of how much data (that is already collected) need be stored for future use, and on methods of reducing the quantity of data without necessarily reducing the information content. Several linear interpolation and least squares methods are explored for achieving data reduction, using as a means of illustration twenty-three different types of hydrologic records. Discussed also is the value of the data, the desired accuracy needed for various water resources studies, and the costs of data reduction as compared to data storage and retrieval. The type of data for which these reduction methods are particularly well-suited is that associated with long linear trends. (Bell-Cornell)
W73-06505

A COMPUTERIZED PROCEDURE TO DETERMINE AQUIFER CHARACTERISTICS,
Texas Tech Univ., Lubbock. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W73-06508

PARAMETER SELECTION IN TELEMETRY SYSTEMS FOR IRRIGATION,
South Dakota State Univ., Brookings. Water Resources Inst.
A. J. Kurtenbach, and D. E. Sander.
Available from the National Technical Information Service as PB-217 876, $3.00 in paper copy, $0.95 in microfiche. South Dakota Water Resources Institute, Brookings, Completion Report, January 1973. 82 p, 10 fig, 3 tab, 13 ref, append. OWRR A-024-SDAK (2). 14-31-0001-3542.

Descriptors: *Telemetry, *Irrigation systems, Sampling, *Valves, *Automation, *Control systems, *On-site data collections, Flow control.
Identifiers: Sequencers, Programmers.

The results of studying the telemetry and control system requirements and fabrication and test of certain portions of an automated irrigation system

are described. The primary areas of work involve the gathering of field data, such as soil moisture, from numerous points in the field by the use of telemetry and then using this data to control automated valves which in turn control flow rate to the various field locations. Two telemetry systems are studied. A programmed telemetry system consists of field sensor stations which are preprogrammed to transmit field data at specific intervals during the day to a central receiving station. This system is felt to be desirable in smaller irrigation systems where the operator is performing the 'when to irrigate' decision. The second system studied is an interrogate system whereby the central station transmits an interrogation signal to each sensor station whenever it requires data from that particular station. The station responds by sending the required data back. This system has the flexibility required for large area irrigation systems and is easily adapted to central station automated control. One disadvantage is the requirement of continuous power for interrogation receivers at the sensor stations. An automatic valve is developed which accepts electrical signals from the control station and regulates the flow of water to a constant flow in the presence of variations in supply pressure. The automated valve system incorporates a reversing motor, butterfly valve and pressure sensor as well as a flow programmer sequencer mechanism. (Wiersma-South Dakota)
W73-06519

MATHEMATICAL MODELS OF WATER QUALITY PARAMETERS FOR RIVERS AND ESTUARIES,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 05B.
W73-06520

THE DESIGN OF A MANAGEMENT INFORMATION SYSTEM FOR COASTAL RESOURCES PLANNING,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06598

1972 OBERS PROJECTIONS ECONOMIC ACTIVITY IN THE UNITED STATES, VOLUME 1: CONCEPTS, METHODOLOGY, AND SUMMARY DATA.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06B.
W73-06620

WHAT'S NEW IN--AUTOMATIC PROCESS CONTROL,
Flour Corp. Ltd., Los Angeles, Calif.
H. Simon.
Chemical Engineering, Deskbook Issue, Vol 79, No 20, p 49-60, September 11, 1972. 14 fig, 35 ref.

Descriptors: *Automatic control, *Equipment, Computers, Valves, Automation, Electrical equipment, Hydraulic equipment, Butterfly valves, Laboratory equipment, Temperature, Pressure, Water levels, Chemical engineering, Electronic equipment.
Identifiers: *Systems engineering, Transmitters, Transducers, Multiplexing, Cathode ray tubes, Digital control, Analog control, Computer loading.

An updated description of equipment and systems for automatic process control is presented which surveys the new transducers, transmitters, controllers, valves, process computers, multiplexing systems, hydraulic systems and chemical engineering systems used in various applications. (Mackan-Battelle)
W73-06626

NATIONAL ASSESSMENT OF TRENDS IN WATER QUALITY.
Enviro Control Inc., Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-06628

ON-LINE ELEMENTAL ANALYSIS OF GAS--CHROMATOGRAPHIC EFFLUENTS,
Armstrong Cork Co., Lancaster, Pa. Research and Development Center.
For primary bibliographic entry see Field 05A.
W73-06680

SOLAR RADIATION: ABSENCE OF AIR POLLUTION TRENDS AT MAUNA LOA,
National Oceanic and Atmospheric Administration, Hilo, Hawaii. Mauna Loa Observatory.
H. T. Ellis, and R. F. Pueschel.
Science, Vol 177, No 3985, p 845-846, May 21, 1972. 1 fig, 5 ref.

Descriptors: *Solar radiation, *Air pollution, *Hawaii, Turbidity, Temperature, Volcanoes, Dusts, Aerosols, Atmosphere, Industrial waste.
Identifiers: Stratosphere, Trophosphere, Insolation.

Measurements of solar radiation made at Mauna Loa, Hawaii, over a period of 13 years give no evidence that human activities affect atmospheric turbidity on a global scale. Short-term fluctuations in insolation appear to be associated with naturally produced tropospheric aerosols. The intrusion of volcanic dust into the stratosphere results in prolonged increases in atmospheric opacity due to the extended residence times of aerosols in the stratosphere. (Oleszkiewicz-Vanderbilt)
W73-06684

WATER LEVELS AND ARTESIAN PRESSURES IN THE CHAD BASIN OF NORTHEASTERN NIGERIA, 1963-68,
Geological Survey, Washington, D.C.
S. W. Carmalt, and G. C. Tibbitts, Jr.
Geological Survey open-file report, 1969. 73 p, 5 fig, 2 tab, 10 ref.

Descriptors: *Groundwater resources, *Water levels, *Observation wells, *Basic data collections, Foreign countries, Aquifers, Aquifer characteristics, Hydrogeology, Precipitation (Atmospheric), Surface waters, Groundwater recharge, Hydrographs, Dug wells, Boreholes.
Identifiers: *Africa (Nigeria).

Records are presented of water levels and artesian pressures collected during 1963-68 on an observational network of 116 dug wells and boreholes (drilled wells) in the Chad basin of northeastern Nigeria. The Chad basin is underlain by the Chad Formation, a series of fluvio-lacustrine sediments which attain a thickness of 1,500 feet or more in Nigeria. Three water-bearing zones, designated Upper, Middle and Lower, have been identified in the Chad Formation of Nigeria. The Upper Zone aquifer, which contains water under both unconfined and confined conditions, provides the principal source of water to dug wells for domestic and village water supply. The Middle Zone aquifer is tapped by numerous deep boreholes which provide water by artesian flow in more than 13,000 square miles of Nigeria north and east of Maiduguri. The Lower Zone, which is also confined, has only been identified in the vicinity of Maiduguri. (Woodard-USGS)
W73-06717

WATER RESOURCES AND GENERAL GEOLOGY OF GRANT COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 02E.
W73-06718

GENERALIZING WATER TABLE DATA,
North Carolina State Univ., Raleigh. Dept. of Statistics.
For primary bibliographic entry see Field 02F.
W73-06732

RAINFALL-RUNOFF DATA FROM SMALL WATERSHEDS IN COLORADO, JUNE 1968 THROUGH SEPTEMBER 1971,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02A.
W73-06736

STATISTICAL INTERPRETATION OF HYDROMETEOROLOGICAL EXTREME VALUES,
B. Samuelsson.
Nordic Hydrology, Vol 3, No 4, p 199-213, 1972. 2 fig, 7 tab, 6 ref.

Descriptors: *Statistical methods, *Hydrologic data, Frequency analysis, Data processing, Probability, Statistics.
Identifiers: *Extreme value distribution.

Methods used to calculate extreme distributions for low probability annual extremes of rainfall and streamflow are discussed. The Jenkinson method, being strictly objective, has the particular advantage of taking into account the extreme part of the extreme value distribution. The method may be applied to extreme values which significantly belong to several different kinds of frequency distributions. The Jenkinson method may be used to extrapolate statistical characteristics from a series of statistically unstable short-term data. (Knapp-USGS)
W73-06816

SINGLE AND MULTI-SITE OPERATIONAL HYDROLOGY,
Monash Univ., Clayton (Australia).
For primary bibliographic entry see Field 02A.
W73-06817

LAND USE IN THE BIG CYPRESS AREA, SOUTHERN FLORIDA,
Geological Survey, Tallahassee, Fla.
J. T. Armbruster.
Florida Bureau of Geology Map Series No 50, 1972. 1 sheet, 1 map, 5 ref.

Descriptors: *Land use, *Water resources development, *Florida, *Gulf Coastal Plain, Urbanization, Recreation facilities, Agriculture, Cattle, Land development, Land management, Canals, Swamps, Estuaries, Gulf of Mexico, Environmental effects, Ecosystems, Maps.
Identifiers: *Big Cypress area (Fla), *Naples (Fla).

This one-sheet atlas describes land use of the Big Cypress physiographic province in southern Florida, southwest of Lake Okeechobee. It is a hydrologic unit of 2,450 square miles of flat swampy area that merges into a coastal-marsh and estuarine environment. The Big Cypress has been divided into 3 subareas. The subareas have reasonably distinct internal drainage determined largely by topographic configuration and man-made drainage. These manmade water-control measures generally establish patterns for urbanization. Development of the Big Cypress started in 1926 with the building of the Barron River Canal. It continued in 1928 with the excavation of the Tamiami Canal. The canals were the sources of fill for State Road 29 and U.S. Highway 41, respectively. In all, 49 bridges distribute flow to the west part of Everglades National Park along the 37-mile reach of the Tamiami Canal between 40-mile Bend and State Road 29. The Turner River Canal was completed during the late 1950's and served as the source of fill for State Road 840A. Initially, land use along most of these canals was primarily agricultural. Later, small residential

areas appeared. The most significant development has been residential land use. (Woodard-USGS)
W73-06825

AREAL RAINFALL EVALUATION USING TWO SURFACE FITTING TECHNIQUES,
Imperial Coll. of Science and Technology, London (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 02B.
W73-06830

A NATIONAL SYSTEM FOR EXCHANGE OF WATER DATA,
Geological Survey, Washington, D.C.
S. M. Lang, and W. W. Doyel.
Hydrological Sciences Bulletin (IAHS), Vol 17, No 4, p 435-441, December 1972. 3 fig, 1 tab.

Descriptors: *Hydrologic data, *Data storage and retrieval, Data collections, Data processing, Basic data collections, Data transmission, Federal government.
Identifiers: *National Water Data Exchange (NAWDEX).

A system is proposed by a Federal Interagency Work Group for providing access to large quantities of hydrological data. The National Water Data Exchange (NAWDEX) will be a confederation of data-acquisition organizations that are willing to make their data available to other data users. NAWDEX will take full advantage of on-going data handling activities and will provide the means to present data in a standard format. An ultimate goal of the system will be standardization and quality control of all of the data. Management of NAWDEX will be lodged in a Systems Central, which will assure that data are made available according to the time frame and the format required by the user. Access to the data will be through an index maintained by Systems Central. Full implementation of NAWDEX will require 4 to 5 years. A technical advisory group, consisting of members representing the Federal and non-Federal sectors, and topical work groups, established in response to specific needs, will provide input during the development of NAWDEX. (Knapp-USGS)
W73-06832

REPRESENTATIVE AND EXPERIMENTAL CATCHMENTS AND MATHEMATICAL MODELS APPLIED IN HYDROLOGY (TAJJELLEMZO ES KISERLETI VIZGYUJTOK ES A HIDROLOGIABAN ALKALMAZOTT MATEMATIKAI MODELLEK),
For primary bibliographic entry see Field 02A.
W73-06842

WATER RESOURCES INVENTORY,
Lake Porter County Regional Transportation and Planning Commission, Crown Point, Ind.
For primary bibliographic entry see Field 03D.
W73-06916

COMPUTER MODELING OF A CONIFEROUS FOREST WATERSHED,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 02A.
W73-06948

STOCHASTIC HYDROLOGY,
Grumman Aerospace Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 02A.
W73-06950

CALIFORNIA STREAMFLOW CHARACTERISTICS (FROM RECORDS THROUGH 1968)--VOLUME 1: COLORADO RIVER BASIN, SOUTHERN GREAT BASIN, AND PACIFIC SLOPE BASINS, EXCLUDING CENTRAL VALLEY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
L. N. Jorgensen, M. A. Rose, R. D. Busch, and J. S. Bader.
Geological Survey open-file report, June 7, 1971. 657 p, 1 tab.

Descriptors: *Streamflow, *Flow characteristics, *Flow rates, *Stream gages, *California, Hydrologic data, Basic data collections, Gaging stations, Discharge measurement, Average flow, Low flow, Peak discharge, Reviews, Colorado River.
Identifiers: *Southern Great basin (Calif), *Pacific Slope basins (Calif).

Tables in this report (Volume 1 of two volumes) summarize streamflow data for the Colorado River basin, Southern Great basin and Pacific Slope basins (excluding Central Valley) in California and adjacent areas for each year of record through September 1968. The tables include station descriptions, duration tables of daily discharge, highest mean discharge each year for specified consecutive periods, lowest mean discharge each year for specified consecutive periods, and statistics for monthly and annual mean discharges. These statistics give information about the quantity, distribution, and variability of streamflow and provide the basic data for developing relations from which estimates can be made of streamflow characteristics for sites other than those gaged. (See also W73-07035) (Woodard-USGS)
W73-07034

CALIFORNIA STREAMFLOW CHARACTERISTICS (FROM RECORDS THROUGH 1968)--VOLUME 2: NORTHERN GREAT BASIN AND CENTRAL VALLEY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
L. N. Jorgensen, M. A. Rose, R. D. Busch, and J. S. Bader.
Geological Survey open-file report, June 7, 1971. 763 p, 1 tab.

Descriptors: *Streamflow, *Flow characteristics, *Flow rates, *Stream gages, *California, Hydrologic data, Basic data collections, Gaging stations, Discharge measurement, Average flow, Low flow, Peak discharge, Reviews.
Identifiers: *Northern Great Basin (Calif), *Central Valley (Calif).

Tables in this report (Volume 2 of two volumes) summarize streamflow data for the Northern Great basin and Central Valley in California and adjacent areas for each year of record through September 1968. The tables include station descriptions, duration tables of daily discharge, highest mean discharge each year for specified consecutive periods, lowest mean discharge each year for specified consecutive periods, and statistics for monthly and annual mean discharges. These statistics give information about the quantity, distribution, and variability of streamflow and provide the basic data for developing relations from which estimates can be made of streamflow characteristics for sites other than those gaged. (See also W73-07034) (Woodard-USGS)
W73-07035

STOCHASTIC ANALYSIS OF LAKE SUPERIOR ELEVATIONS FOR COMPUTATION OF RELATIVE CRUSTAL MOVEMENT,
Department of the Environment, Ottawa (Ontario). Water Management Service.
For primary bibliographic entry see Field 02H.
W73-07047

08. ENGINEERING WORKS

8A. Structures

DESIGN VERSUS ECOLOGY IN ST. JOHNS AND INDIAN RIVERS,
Reynolds, Smith and Hills, Jacksonville, Fla.
For primary bibliographic entry see Field 05C.
W73-06692

DESIGN OF CROSS-FLOW COOLING TOWERS AND AMMONIA STRIPPING TOWERS,
IIT Research Inst., Chicago, Ill.
W. J. Wnek, and R. H. Snow.
Industrial and Engineering Chemistry Process Design and Development, Vol 11, No 3, p 343-349, 1972. 4 fig, 5 tab, 19 ref. EPA-14-12-463.

Descriptors: *Thermal pollution, *Cooling towers, *Ammonia, Water pollution control, Ventilation, *Waste water treatment, Effluents, Hydraulic engineering, Mathematical models, Cost analysis, *Design.
Identifiers: Finite-difference method, Cross-flow cooling.

A method of designing cross-flow cooling and ammonia stripping towers is presented which avoids the numerical analysis previously required for cooling tower design. Approximate analytical solutions are obtained for the simultaneous equations of conservation of energy and mass. The results agree with examples from the literature obtained by a less general finite-difference method, and also with data from a pilot ammonia stripping tower. Equipment and operating cost correlations are presented, and also a method to optimize ammonia stripping tower design geometries. A sample calculation for a 1-million gpd tower treating waste water from a typical municipal treatment plant shows that a tower 57 ft high with packing only 7 ft thick is optimum to reduce ammonia concentration by 40:1. The capital cost for the example tower is $1 million, while the total unit cost is 4 cents/1000 gal. Such high costs make the use of stripping towers unlikely for waste water treatment, although they cannot be ruled out because other feasible methods have so far not been found. The design methods are applicable to other cross-flow stripping systems, such as odor control. (Jerome-Vanderbilt)
W73-06695

U.S. DEEPWATER PORT STUDY--SUMMARY AND CONCLUSIONS.
Robert R. Nathan Associates, Inc, Washington, DC.

Available from NTIS, Springfield, Va 22151 Price $3.00 printed copy; 95 cents microfiche. Army Corps of Engineers Institute for Water Resources Report IWR 72-8 (Vol I of 5 vol), August 1972. 74 p, 4 tab. DACW 31-71-C-0045.

Descriptors: *Harbors, *Coastal structures, *Navigation, *Foreign trade, *Port authorities, Ships, Facilities, Deep water, Marketing, Planning, Export, Import, Economics, Environmental effects, Coastal engineering, Dredging, Reviews, Evaluation, Inland waterways, Transportation, Elasticity of demand, Elasticity of supply, Economic efficiency, Projections.
Identifiers: *U.S. deepwater port study, Shipping, Bulk commodities.

This report, volume I of five volumes summarizes the overall appraisal of deep port needs for the United States by means of identification of the factors critical to U.S. deepwater port decision, development of criteria appropriate to the evaluation of engineering, economic and environmental

aspects of deep port needs and policies, analysis of the development options available at this time and the critical issues surrounding each, and the identification of critical issues which need further analysis. The study emphasizes port requirements for bulk commodities. The world market for seaborne movement of bulk commodities is huge and is growing very rapidly. In 1971 it included more than 1.7 billion metric tons of the six major bulk commodities covered in this study. Among them, crude petroleum accounted for over 60%; petroleum products, around 12%; iron ore, 14%; and coal and grain, most of the balance. The United States accounted for about 15% of total world seaborne trade in these commodities. (See also W73-03136 and W73-06712 thru W73-06714) (Woodard-USGS)
W73-06711

U.S. DEEPWATER PORT STUDY--COMMODITY STUDIES AND PROJECTIONS.
Nathan (Robert R.) Associates, Inc., Washington, D.C.

Available from NTIS, Springfield, Va 22151 Price $6.00 printed copy. Army Corps of Engineers Institute for Water Resources Report IWR 72-8 (Vol II of 5 Vol), August 1972. 603 p. DACW 31-71-C-0045.

Descriptors: *Harbors, *Foreign trade, *Import, *Export, Projections, Marketing, Oil, Iron, Aluminum, Coals, Grains (Crops), Soybeans, Phosphates, Economics, United States, Navigation, Ships, Facilities, Coastal engineering, Human population, Europe, Canada.
Identifiers: *U.S. deepwater port study, Shipping, Bulk commodities, Japan.

The main topics in this volume (Volume II) are: long-term projections of economic aggregates for the United States, Europe, and Japan; crude petroleum and petroleum products; U.S. iron ore imports; imports of aluminum raw materials (bauxite and alumina); U.S. coal exports, U.S. exports of grains, soybeans, and meal; U.S. exports of phosphate rock; and analysis of Mainland China's prospective grain import requirements and coking coal export potential. (See also W73-06711) (Woodard-USGS)
W73-06712

U. S. DEEPWATER PORT STUDY--PHYSICAL COAST AND PORT CHARACTERISTICS, AND SELECTED DEEPWATER PORT ALTERNATIVES.
Nathan (Robert R.) Associates, Inc., Washington, D.C.

Available from NTIS, Springfield, Va 22151, Price $6.00 printed copy. Army Corps of Engineers Institute for Water Resources Report IWR 72-8 (Vol III of 5 vol), August 1972. 542 p, 40 fig, 111 tab. DACW 31-71-C-0045.

Descriptors: *Harbors, *Coastal structures, *Navigation, *Foreign trade, *Channel improvement, Facilities, Deep water, Design criteria, Data collections, Planning, Environmental effects, Economics, Dredging, Engineering structures, Inlets (Waterways), Ships, Import, Export.
Identifiers: *U.S. deepwater port study, Bulk commodities.

The main topics in this volume (Volume III) are: reconnaissance survey of U.S. coastal areas, ports, and port facilities; design criteria, engineering requirements, and cost estimates of deepwater port alternatives selected for detailed analysis; description of coast and port locations; foreign and coastal movements, by port, of the six study commodities; major harbors and channels; and physical obstacles to channel enlargement. (See also W73-06711) (Woodard-USGS)
W73-06713

U.S. DEEPWATER PORT STUDY--TRANSPORT AND BENEFIT-COST RELATIONSHIPS,
Nathan (Robert R.) Associates, Inc., Washington, D.C.

Available for NTIS, Springfield, Va 22151 Price $6.00 printed copy. Army Corps of Engineers Institute for Water Resources Report IWR 72-8 (Vol V of 5 vol), August 1972. 563 p, 18 fig, 140 tab. DACW 31-71-C-0045.

Descriptors: *Harbors, *Foreign trade, *Transportation, *Ships, Costs, Facilities, Economics, Marketing, Market value, Economic efficiency, Industrial production, Planning, Projections, Elasticity of demand, Elasticity of supply, Coastal engineering, Engineering structures, Import, Export.
Identifiers: *U.S. deepwater port study, Bulk commodities.

The main topics in this volume (Volume V) are: transport of bulk commodities; transport benefit-cost relationships for selected investment alternatives; and ocean transport of major bulk commodities in U.S. foreign trade, 1968 and 1969 (patterns of geographic linkage and flows through U.S. and foreign ports). (See also W73-06711) (Woodard-USGS)
W73-06714

MINIMUM EXPECTED COST OPTIMIZATION,
Massachusetts Inst. of Tech., Cambridge.
S. Mau, and R. G. Sexsmith.
Journal of the Structural Division, American Society of Civil Engineers, Vol 98, No ST9, p 2043-2058, Sept., 1972. 5 fig, 3 tab, 27 ref, 2 append.

Descriptors: *Structural design, *Optimization, *Costs, Safety, Decision making, Structural engineering, Failure, Yield strength, Constraints, Stress, Weight, Dynamic programming, Bibliographies.
Identifiers: *Optimum design, *Probability theory, Dynamic methods, Statistical analysis, Trusses.

A major goal of structural design is to achieve harmony between maximum safety and minimum cost. To approach this goal, a number of optimization techniques are used. A probabilistic optimum design approach is presented with minimum expected cost as the design objective. Statically determinate trusses are used to demonstrate the approach. The minimization of expected cost is shown as being equivalent to minimum weight with a probability of failure, constraint. Sensitivity studies of safety index, cost of failure, and material and load parameters are presented. A simple design aid is included for the expected cost optimization of statically determinate trusses with random strength and deterministic load. (USBR)
W73-06996

MONTANA POWER COMPANY'S DAM REPAIR PROGRAM,
Federal Power Commission, Chicago, Ill.
C. L. Emmerling.
Journal of the Construction Division, American Society of Civil Engineers, Vol 98, No CO2, p 295-311, Sept., 1972. 15 fig, 1 tab.

Descriptors: *Dams, *Maintenance, *Repairing, *Safety factors, Concrete dams, Reinforced concrete, Construction, Grouting, Montana, Anchors, Finite element method, Earth dams, Rockfill dams, Gravity dams, Floods.
Identifiers: *Federal Power Commission, Concrete deterioration, Posttensioning, Construction methods, Stressing cables, Stability analysis, Earthquake loads.

The Montana Power Company completed repairs and structural improvements to 7 dams on the Missouri and Madison Rivers. The repair program was initiated upon the recommendation of 2 consulting engineering firms after a safety inspection of the project in 1968 by the Federal Power Commission. Studies showed that the dams were structurally adequate under normal loading conditions. However, under maximum probable flood and earthquake loadings now applied to major new dams, the structures did not have adequate safety factors. Modifications included: (1) installing post tensioned cables, (2) reconstructing spillway piers, (3) reconstruction of dam sections by installing downstream mass concrete structures, (4) grouting, and (5) raising one rockfill embankment. Drawings, tables, and photographs illustrate the nature and details of the work. (USBR)
W73-07000

8B. Hydraulics

OPERATIONAL CHARACTERISTICS OF A NUMERICAL SOLUTION FOR THE SIMULATION OF OPEN CHANNEL FLOW,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources.
For primary bibliographic entry see Field 02E.
W73-06504

MAINTENANCE DREDGING, ANDREWS RIVER, MASSACHUSETTS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as EIS-MA-72-5008-F, $4.00 in paper copy, $0.95 in microfiche. May 8, 1972. 38 p, 2 map, 1 tab.

Descriptors: *Environmental effects, *Dredging, *Massachusetts, *Turbidity, *Harbors, Water resources development, Comprehensive planning, Regional development, Spoil banks, Excavation, Navigation, Marine plants, Marine animals, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Andrews River (Mass).

This proposed project consists of maintenance dredging of the channel and anchorage basin of Andrews River (Saguatucket Harbor), Massachusetts, in fiscal year 1973. Approximately 35,000 cubic yards of shoal material will be removed. The project will allow for safer passage and mooring of recreational and commercial craft in the harbor. Adverse environmental effects include temporary short term effects on marine fauna and benthic organisms due to turbidity increases and increases in the BOD and COD counts resulting from the dredging. Alternatives considered included no maintenance and alternative spoil disposal sites. Comments from concerned agencies are included. (Mockler-Florida)
W73-06577

DREDGING ON LONG ISLAND,
Center for The Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06599

COAST STABILIZATION AND PROTECTION ON LONG ISLAND,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 06B.
W73-06600

UPSTREAM BOUNDARY-LAYER SEPARATION IN STRATIFIED FLOW,
California Univ., San Diego, La Jolla. Inst. of Geophysics and Planetary Physics.
J. W. Miles.

Journal of Fluid Mechanics, Vol 48, Part 4, p 791-800, 1971. 5 fig, 12 ref. NSF GA-10324, Nonr-00014-69-A-0200-6005.

Descriptors: *Flow, *Boundary layers, *Stratification, Hydraulic engineering, Physics, Compressible flow, Flow characteristics, Stream flow forecasting, Density, Eddies, Turbulence, Pressure, Froude numbers, Velocity, Stagnation, Mathematical studies.

Stratified, inviscid channel flow over a thin barrier or into an abrupt contraction is considered on the hypothesis that the upstream dynamic pressure and density gradient are constant (Long's model) for those parametric regimes in which the hypothesis is tenable for finite-amplitude disturbances, namely k less than 2 for the barrier and k less than 1 for the contraction, where k is an inverse Froude number based on the Vaisala frequency N, the channel height H, and the upstream velocity U. Reverse flow in the neighborhood of the forward stagnation point, which implies the formation of an upstream separation bubble, is found for certain critical ranges of k. The maximum barrier height for which the dominant lee-wave mode can exist without reversed flow either upstream or downstream of the barrier is 0.34H. The limiting case of a half space is considered briefly, and forward separation is found for certain values of k. (Jerome-Vanderbilt)
W73-06690

HYDROTHERMAL ANALYSIS BY FINITE ELEMENT METHOD,
Sargent and Lundy, Chicago, Ill.
For primary bibliographic entry see Field 05B.
W73-06693

CHANNEL CHANGES OF THE GILA RIVER IN SAFFORD VALLEY, ARIZONA, 1846-1970,
Geological Survey, Washington, D.C.
D. E. Burkham.
Available from GPO, Washington, DC, 20402, Price $2.00. Geological Survey Professional Paper 655-G, 1972. 24 p, 9 fig, 5 plate, 3 tab, 25 ref.

Descriptors: *Channel morphology, *Channel erosion, *Floods, *Streamflow, *Arizona, Flood plains, Topography, Vegetation, Sediment transport, Sedimentation, Erosion control, Sediment control, Flood control, Channel improvement, Maps, Photography, Stream gages, Data collections.
Identifiers: *Gila River (Ariz), *Safford Valley (Ariz).

The stream channel of the Gila River in Safford Valley, Ariz., changed significantly from 1846 to 1970. The stream channel was fairly stable and narrow from 1846 to 1904. The average width of the stream channel was less than 150 feet in 1875 and less than 300 feet in 1903. During 1905-17 major destruction of the flood plain took place, and the average stream-channel width increased to about 2,000 feet. Reconstruction of the flood plain was underway during 1918-70; the stream channel narrowed, and the average width was less than 200 feet in 1964. The flood plain became densely covered with saltcedar during 1918-70. Minor widening of the stream channel occurred in 1965 and in 1967, and the average width of the channel was about 400 feet in 1968. The temporal distribution of flow and the average annual flow--about 260,000 acre-feet--at the head of Safford Valley during 1920-64 probably were about the same as those during 1800-1904. Based on this premise the flood of November 1905, which had a peak flow rate of about 150,000 cfs, probably was the largest flood in more than 170 years. (Woodard-USGS)
W73-06737

HYDRAULIC EQUATIONS OF SEDIMENT-CARRYING FLOWS IN CHANNELS WITH DEFORMED BOUNDARIES (URAVNENIYA GIDRAVLIKI NANOSONESUSHCHIKH POTOKOV V RUSLAKH S DEFORMIRUYEMYMI GRANITSAMI),
For primary bibliographic entry see Field 02J.
W73-06807

LABORATORY INVESTIGATIONS OF THE DRAG COEFFICIENT OF MUDFLOW CONTROL STRUCTURES OF THE TYPE DESIGNED BY THE TRANSCAUCASIAN HYDROMETEOROLOGICAL RESEARCH INSTITUTE (LABORATORNYYE ISSLEDOVANIYA KOEFFITSIYENTA LOBOVOGO SOPROTIVLENIYA PROTIVOSELEVYKH SOORUZHENIY SISTEMY ZAKNIGMI),
For primary bibliographic entry see Field 02J.
W73-06808

PREDICTION OF SHALLOW-WATER SPECTRA,
Tetra Tech, Inc., Pasadena, Calif.
J. I. Collins.
Journal of Geophysical Research, Vol 77, No 15, p 2693-2707, May 20, 1972. 14 fig, 29 ref.

Descriptors: *Oceans, *Free surfaces, *Shallow water, *Air-water interfaces, *Waves (Water), Coastal engineering, Ocean waves, Forecasting, Numerical analysis, Refraction (Water waves), Winds, Geomorphology, Equations, Correlation analysis, Measurement.
Identifiers: *Shallow-water spectra, Shoaling, Bottom friction.

Significant changes occur in the sea-surface spectrum as it propagates from deep to shallow water. These changes are a combined result of nondissipative forces (refraction, shoaling) and dissipative-generative forces (bottom friction, wind generation, wave breaking). Two prediction schemes for these changes are developed. Numerical predictions of spectral changes in shoaling water are made and compared with observed data. For many practical forecasting situations one of these two schemes can be used to develop reasonably accurate sea-state predictions in shallow water. For example, with a straight beach the parallel bottom-contour model will yield accurate predictions directly and at a lower cost than the irregular bottom-topography model. In the neighborhood of a headland or narrow bay the one-dimensional model can be applied up to the area where the offshore bottom contours show significant curvature in plan, and then the irregular bottom-contour prediction model can be applied. (Woodard-USGS)
W73-06814

SHOALING OF SPIRAL WAVES IN A CIRCULAR BASIN,
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
For primary bibliographic entry see Field 02J.
W73-06827

A WAVE CLIMATOLOGY FOR U.S. COASTAL WATERS,
Army Coastal Engineering Research Center, Washington, D.C.
E. F. Thompson, and D. L. Harris.
Reprint 1-72, May 1972. 14 p, 17 fig, 4 tab, 6 ref. (Paper OTC 1693, reprinted from 4th Offshore Technology Conference, May 1-3, 1972, Houston, Tex.).

Descriptors: *Waves (Water), *Oceans, *Coasts, Data collections, Height, Measurement, Data collections, Analytical techniques, Gages, Correlation analysis, Forecasting, Coastal engineering.
Identifiers: *Wave climatology.

Over the past 20 years, the Coastal Engineering Research Center has operated wave gages along the Atlantic, Pacific, and Gulf coasts of the U.S. Cumulative wave-height distribution functions for 10 gage locations were studied in the format of the exponential distribution. One complete year of data, at 6 observations per day, gives a reliable wave height distribution up to the 1% level of occurrence. Wave data from shipboard weather reports were compared to wave gage data in describing long-term summaries of coastal wave-height conditions. (Woodard-USGS)
W73-06837

FINITE-AMPLITUDE, SHALLOW WATER--WAVES OF PERIODICALLY RECURRING FORM,
Army Coastal Engineering Research Center, Washington, D.C.
C. J. Galvin, Jr.
Reprint 5-72, September 1970. 32 p, 25 ref. (Reprinted from Proceedings of Symposium on Long Waves, held at University of Delaware, Sept 10-11, 1970.)

Descriptors: *Waves (Water), *Ocean waves, *Hydrodynamics, Shallow water, Coasts, Flow characteristics, Analytical techniques, Coastal engineering.
Identifiers: *Wave action, Finite-amplitude, Wave breaks.

Finite-amplitude, periodic, sinusoidal waves generated in constant-depth shallow water break down into two or more waves traveling at speeds dependent on their height. These waves are called solitons (waves resembling solitary waves). A large soliton overtakes previously generated smaller solitons, and the amplitude of the larger wave temporarily decreases during the resulting interaction. This decrease in amplitude can be qualitatively explained by the acceleration and spreading of the larger wave when its leading edge encounters the deeper water of the smaller wave. The larger wave regains its initial amplitude on passing through the smaller wave. If followed long enough, the interacting solitons periodically assume the initial wave form. In the experiments, solitons occurred at depth-to-wave length ratios (d/L) less than 0.1 and height-to-depth ratios (H/d) greater than 0.05. The number of solitons increases with decreasing d/L and is relatively independent of H/d. (Woodard-USGS)
W73-06840

ATTENUATION OF WIND-GENERATED DEEP WATER WAVES BY VERTICAL JET BREAKWATERS,
Massachusetts Univ., Amherst. School of Engineering.
J. M. Lacouture, J. M. Colonell, and C. E. Carver, Jr.
Available from NTIS, Springfield, Va 22151 AD-748 190; Price $3.00 printed copy; 95 cents microfiche. Massachusetts University School of Engineering, Report No UM-72-6, June 1972. 114 p, 48 fig, 9 tab, 36 ref, append.. ONR NR 200-016. ONR N0014-68-A-0146.

Descriptors: *Breakwaters, *Coastal structures, *Ocean waves, *Wind tides, Design criteria, Data collections, Shore protection, Testing procedures, Engineering structures.
Identifiers: *Wave dampers, Jet hydraulic breakwaters, Pneumatic breakwaters.

The effects of vertical jet hydraulic and pneumatic breakwaters on wind-generated deep-water waves were investigated. Experimental data were collected for each breakwater operating separately and in various combinations. Water surface elevations, recorded in analog form on magnetic tape, were digitized and analyzed with the aid of a digital computer. The pneumatic breakwater is slightly more effective in attenuating deep-water

waves than the hydraulic breakwater. Also the effectiveness of both breakwaters operating in series was not as great as either breakwater operating alone. The breakwaters, whether operating separately or in combination, were found to attenuate random waves over the same frequency band. (Woodard-USGS)
W73-06951

BREAKWATER STUDIES IN WAVE TANKS,
Delaware Univ., Newark. Coll. of Marine Studies.
K. P. H. Frey.
Available NTIS, Springfield, Va. 22151 AD-749 090 Price $3.00 printed copy; 95 cents microfiche. Technical Report No 14, July 1972. 45 p, 28 fig, 3 tab, 34 ref. ONR Contract No N00014-69-A0407.

Descriptors: *Breakwaters, *Coastal structures, *Ocean waves, *Shore protection, Reviews, Model studies, Floating, Retaining walls, Sea walls, Design criteria, Economics, Costs, Evaluation, Waves (Water).
Identifiers: Wave action.

A study was made to develop a basic breakwater design of such flexible construction that a minimum of experimental studies would be required. Considering the range of nearshore waves and grounds, stationary and floating devices were chosen. The utilization of building block concepts is advisable for single and multiple devices resulting in breakwater systems. Cost consciousness is suggested to judge effectiveness regarding attenuation of waves in conjunction with the cost of the total construction. This includes watching the chord length measured in terms of fractions of the maximum design wavelength, and the forces which must be safely transmitted to the ground. The unconventional designs also seem to be well suited for experimental facilities if low reflection coefficients are needed. (Woodard-USGS)
W73-06963

A COMPARATIVE STUDY ON FLOOD ROUTING COMPUTATION,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W73-07026

AN EXPERIMENTAL STUDY OF THE APPLICATION OF KINEMATIC-WAVE THEORY TO OVERLAND FLOW,
Melbourne Univ., Parkville (Australia). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 02E.
W73-07045

HYDRAULIC INVESTIGATION OF CRITICAL GRADIENTS FOR APPROACHES TO FARM WATER STORAGES,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
R. T. Hattersley, and K. C. Yong.
New South Wales University Water Research Laboratory Report No 127, May 1972. 13 p, 6 fig, 2 tab, 5 ref.

Descriptors: *Farm ponds, *Water storage, *Irrigation, *Design criteria, *Sediment control, Slopes, Dams, Laboratory tests, Soil mechanics, Flumes, Analytical techniques, Data collections, Particle size, *Australia.
Identifiers: *Australia.

In Australia the storage of water in small, artificially created ponds is economic practically to the point of creating unit volume of water storage per unit volume of excavation. Such storages are frequently used on pastoral properties and for small irrigation projects. The loss of such expensive water storage by siltation becomes a significant problem. Laboratory flume tests were made for three types of soil: Condobolin soils, a loose alluvium from natural deposit, and a representative sand of uniform grain size to evaluate the limiting gradients under the condition of incipient motion. The results can be used to establish design slopes for approaches to farm dams such that only the finest material is carried into the farm storage. (Woodard-USGS)
W73-07048

INFLUENCES OF A FOREST ON THE HYDRAULIC GEOMETRY OF TWO MOUNTAIN STREAMS,
Forest Service (USDA), Albuquerque, N. Mex. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04A.
W73-07138

8C. Hydraulic Machinery

THE FAST BREEDER REACTOR: A SOURCE OF ABUNDANT POWER FOR THE FUTURE,
North American Rockwell Corp., Canoga Park, Calif. Atomics International Div.
For primary bibliographic entry see Field 06D.
W73-06685

8D. Soil Mechanics

SECONDARY CONSOLIDATION AND STRENGTH OF A CLAY,
California Univ., Davis. Dept. of Civil Engineering.
C-K. Shen, K., Arulanandan, and W. S. Smith.
Journal of the Soil Mechanics and Foundations Division, American Society of Civil Engineers, Vol 99, No SMI, Paper 9510, p 95-110, January, 1973. 13 fig, 4 tab, 25 ref.

Descriptors: *Soil mechanics, *Clays, *Pore pressure, *Consolidation, *Bays, California, Design criteria, Engineering structures, Soil physical properties, Stress analysis, Analytical techniques, Soil strength, Soil moisture, Evaluation.
Identifiers: *San Francisco Bay (Calif).

The phenomenon of pore-water pressure buildup due to the arresting of secondary consolidation was thoroughly examined, and it is believed to be related to the secondary consolidation characteristics of the soil. The soil used was the San Francisco Bay Mud, known locally as Bay Mud. The pore-water pressure buildup due to isotropic stress appears to be related to the secondary compression characteristics of the soil. It is suggested that for Bay Mud the amount of pore-water pressure buildup is a linear function of the consolidation pressure, other factors remaining constant. The amount of pore-water pressure buildup is affected by the consolidation period prior to drainage closure; the longer the period, the less is the pressure buildup. The coefficient of secondary consolidation is independent of the load increment for the Bay Mud studies. Secondary consolidation causes an increase in undrained strength and at the same time yields stiffer stress-strain characteristics for Bay Mud. The buildup of pore-water pressure cases the sample to behave as a slightly overconsolidated sample; and during undrained shear, this sample shows steeper stress path at small strains with little or no plastic deformation. (Woodard-USGS)
W73-06811

EXPERIMENTAL DEVELOPMENT OF HEADWARD GROWTH OF CHANNEL NETWORKS,
State Univ. of New York, Binghamton. Dept. of Geology.
J-J. Flint.
Geological Society of America Bulletin, Vol 84, No 3, p 1087-1093, March 1973. 7 fig, 1 tab, 5 ref.

Descriptors: *Hydraulic models, *Erosion, *Headward erosion, Geomorphology, Drainage density, Drainage patterns (Geologic), Profiles, Soil erosion, Land forming.

Two small drainage networks were studied in an earth-fill model subjected to artificial rain. Rates of growth of basin size, total stream length, and number of streams were exponential. Drainage density also increased exponentially, while the relative drainage density, measured from the area directly eroded, maintained uniform values throughout youth and maturity. The profile of the longest stream was experiment, in spite of a marked decrease in stream gradient with time. The hypsometric integral decreased rapidly during the early stages of development, and changed to a linear function of slower rate after the basin had become areally fixed. (Knapp-USGS)
W73-06823

ACOUSTIC PROPERTIES OF FROZEN OTTAWA SAND,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02G.
W73-06972

INSTRUMENTATION FOR DAMS,
Shannon and Wilson, Inc., Seattle, Wash.
S. D. Wilson.
Bulletin of the Association of Engineering Geologists, Vol 9, No 3, p 143-157, Summer, 1972. 3 fig, 1 tab, 4 ref.

Descriptors: *Earth dams, *Instrumentation, Slope stability, Rockfill dams, Settlement (Structural), Earth pressure, Piezometers, On-site investigations, Data collections.
Identifiers: *Measuring instruments, *Rock noise, Pore water pressure, Pressure cells, Inclinometers, Extensometers, Dam stability, Horizontal movement, Internal stress.

Geologists, engineers, and designers have become more aware of the need for field observation of the performance of dams, excavations, and slopes because of increasing monitoring requirements and awareness of hazards of undetected geologic defects. A table given indicates the type of instrumentation required to determine settlements and horizontal movements, water and earth pressures, rock distress, and earthquake response. Instruments discussed include piezometers, inclinometers, extensometers, strain meters, settlement devices, pressure cells, and rock noise detection systems. The open standpipe piezometer is considered the best choice, provided certain conditions are met. The pendulum-type inclinometers have an overall accuracy better than 1 in/100 ft of depth compared to the servoaccelerometer repeatability of 0.2 in./100 ft of depth. Pressure cells should have a minimum diameter of 8 in. Because the quantity of data obtained from a major construction project can grow rapidly, automatic readout systems should be used to acquire data, and a computer used for processing and analysis. (USBR)
W73-06992

VERTICAL UPLIFT TESTS ON MODEL STRAIGHT AND BELLED AUGER FOOTINGS,
Bureau of Reclamation, Denver, Colo.
J. M. Horner.
Report REC-ERC-72-16, June, 1972. 51 p, 53 fig, 4 tab, 3 ref, append.

Descriptors: *Model tests, *Load distribution, Transmission towers, Movement, Test procedures, Design criteria, Soil mechanics, Soil strength, Instrumentation, Reinforced concrete.
Identifiers: *Foundation models, *Uplift resistance, *Footings, Vertical loads, Belled footings, Curve fitting, Auger-type footings, Uplift footings, Pull-out tests.

Instrumented reinforced concrete model footing tests for 5 different depths were performed in a compacted silty clay to determine: (1) the effect of belled and straight bases on total load resistance, (2) load distribution to the footing base and shaft, (3) variation of the total load resistance with footing depth, and (4) appearance of the soil failure pattern after maximum load. Since a transmission tower may fail before the maximum load resistance of a footing is reached, emphasis was placed on the footing loads reached at a failure movement of 0.073 in. Model footing test results at failure movement showed: (1) The belled auger footing resisted from 1.2 to 1.5 times more load than the straight auger footing. (2) The belled auger base resisted from 1.7 to 2.9 times more load than the straight auger base. (3) The shaft resistance was not greatly affected by the footing base type. (4) Except for the shallowest footings, the shaft carried from 40 to 80% of the load. The belled auger footings had considerably more movement before reaching maximum load than straight auger footings of the same depth. All resulting total footing load-movement curves can be fitted to a hyperbolic equation. (USBR)
W73-06993

EVALUATION OF PHOTOGRAMMETRIC CROSS SECTIONS FOR EARTHWORK PAYMENT,
Wisconsin Dept. of Transportation.
V. H. Schultz.
Highway Research Record, No 375, p 1-7, 1972. 2 fig, 4 tab, 5 ref.

Descriptors: *Earthworks, *Payment, *Photogrammetry, *Highway engineering, Surveying, Measurement, Elevation, Cross sections, Volume, Evaluation, Cost comparisons, Accuracy, On-site data collections, Aerial photography.
Identifiers: Earthmoving, Stereoscopic map plotters, Errors, Aerial surveys.

Earthwork quantities computed from conventional field surveys have been used as the basis of payment to contractors for many years. These surveys have given accurate results, but with the advent of freeway construction their cost has steadily risen. A research program was undertaken to determine whether sufficiently accurate quantities could be obtained from photogrammetric cross sections. Earthwork quantities were compared on 4 projects by using both photogrammetric final cross sections and conventional field-measured final cross sections. For dual roadway sections involving 7,500 cu yd or more per station, the difference was 2% or less; on roadway sections involving 12,000 cu yd or more per station, the difference was less than 1%. In all cases the photogrammetric yardage was greater than field measured yardage. The conclusion is that the difference in earthwork quantities is within the range of possible error for the average end area method of computation. Therefore, the photogrammetric method will provide an accurate quantity estimate for payment. (USBR)
W73-06994

AN APPARATUS FOR DETERMINING THE COEFFICIENT OF THERMAL EXPANSION OF ROCKS, MORTARS AND CONCRETES,
National Building Research Inst., Pretoria (South Africa).
P. J. Loubser, and J. G. Bryden.
Magazine of Concrete Research, Vol 24, No 79, p 97-100, June, 1972. 4 fig, 1 tab.

Descriptors: *Thermal expansion, *Thermal properties, *Materials testing, Mortars, Test procedures, Concretes, Temperature, Calibration, Tests, Concrete testing, Expansion, Igneous rocks, Concrete properties, Rock properties, Laboratory equipment, Laboratory tests.
Identifiers: South Africa, Temperature studies, Ovens, Measuring instruments, Coefficients, Test results.

A study of the durability of building materials led to development of an apparatus for determining the coefficient of thermal expansion. The cylindrical chamber contains an electric oven which surrounds a sample having a minimum dimension of 10 by 2 by 2 cm. As the temperature of the sample is increased from 20 to 80 deg C, the sample expands, pushing a small rod against a beam on a fulcrum. The expansion of the specimen is transmitted by the beam to a linear variable differential transformer (LVDT). The LVDT electrical output feeds into a potentiometric strip-chart recorder. Two rods were tested to calibrate the apparatus, one of pure copper and one of pure aluminum. The ratio of thermal expansion coefficients of copper and aluminum measured by this apparatus agreed well with textbook values. Coefficients are given for oven-dried and water-saturated specimens of several materials. (USBR)
W73-06998

MONTANA POWER COMPANY'S DAM REPAIR PROGRAM,
Federal Power Commission, Chicago, Ill.
For primary bibliographic entry see Field 08A.
W73-07000

APPLICATION OF A NEW ANALYTICAL METHOD TO A MODEL OF NON-DARCIAN CONSOLIDATION IN CLAY SOILS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
J. Y.Parlange.
Journal of Hydrology, Vol 18, No 2, P 119-124, February 1973. 1 fig, 6 ref.

Descriptors: *Compaction, *Clays, *Soil mechanics, *Soil water movement, Numerical analysis, Darcys law, Consolidation, Permeability, Equations, Mathematical studies, Infiltration.
Identifiers: *Non-Darcian flow.

Consolidation in clay soil was studied by analytical means and the results compared with a recent numerical solution. Good agreement is obtained when the soil is only weakly non-Darcian. As the non-Darcian behavior of the soil becomes more pronounced the numerical solution is shown to be in error. (Knapp-USGS)
W73-07044

FIELD STUDY OF MOISTURE MOVEMENT AND GROUND HEAVE DURING FREEZE-UP,
McGill Univ., Montreal (Quebec). Soil Mechanics Lab.
For primary bibliographic entry see Field 02G.
W73-07110

AN EARTH FILL DAM ON PERMAFROST, HESS CREEK DAM, LIVENGOOD, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
F. F. Nitze, and O. W. Simoni.
Crrel Technical Report no 196, March 1972.

Descriptors: *Earth dams, *Cold weather construction, *Permafrost, *Embankments, Earth dams.
Identifiers: *Rolled earth fill.

The Hess Creek Dam is a combination hydraulic fill and rolled earth fill structure containing about 479,000 cu yd of earth fill. A steel sheet pile cutoff wall runs along the base centerline. A 48-in.-diam metal pipe outlet with control gate was installed through the embankment at one end and a spillway 1300 ft long and 100 ft wide was built to accommodate flood flow. The performance and present condition of the dam suggest that construction of earth fill embankments on permafrost is feasible and practical. The embankment appears to have had little or no detrimental effect on the underlying permafrost. The refrigeration system installed at the base of the embankment seems to have accomplished its purpose of refreezing foundation soil thawed during the summer construction period. (OWRR)
W73-07111

8E. Rock Mechanics and Geology

A STUDY OF THE FRAGMENTATION WITH WATER AND SOLID IMPACTORS.
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
J. F. Ripken, and J. M. Wetzel.
Available from NTIS, Springfield, Va 22151 AD-746 510; Price $3.00 printed copy; 95 cents microfiche. Project Report No 131, February 1972. 39 p, 15 fig, 1 tab, 21 ref. Bur Mines Contract R0210021.

Descriptors: *Rock mechanics, *Rock excavation, *Rock properties, Water, Jets, Pressure, Testing procedures, Erosion, Engineering structures, Evaluation.
Identifiers: *Rock fragmentation, Water impact, Solid impactors.

Tests were made to see if water slugs of substantial size (up to 1/2 lb) traveling at moderate velocities (<800 fps) could impinge on rock with fragmenting pressure. A compressed air-launching gun was designed and built and an extensive series of impact tests was made on a steel-mounted pressure transducer and on sandstone and limestone targets. In a very few tests pressure values measured on the steel target exceeded the nominal compressive load limits of the rocks, but on actual rock targets significant fragmentation failed to occur. The basic difficulty was related to an inability to maintain a suitable air-water interface on a traveling water slug containing high kinetic energy. This, together with higher-than-anticipated dynamic failure values in the rock, prevented effective fragmentation. Pilot tests which replaced the water with spherical slugs of steel (3/16 to 2 inch diam) resulted in spalling fragmentation and excellent specific energy values. Minimum values of specific energy appeared to occur with velocities below 500 fps. However, the evidence for the 2-inch spheres was limited by the fact that the 12-inch target cubes (sandstone, granite, basalt) shattered at velocities below 400 fps. (Woodard-USGS)
W73-06952

ROCK REINFORCEMENT,
Leeds, Hill and Jewett, Inc., San Francisco, Calif.
T. A. Lang.
Bulletin of the Association of Engineering Geologists, Vol 9, No 3, p 215-239, Summer 1972. 19 fig, 4 ref.

Descriptors: *Rock bolts, Deformation, Rock mechanics, Engineering geology, Rock excavation, Supports, Rock properties.
Identifiers: Shotcrete, Rock slope stability, Stress distribution, Construction methods, Tunnel construction, Tunnel supports, Dowels, Roof bolts, Rock falls, Rock pressure, Underground openings, Deformation restraint, Concentrated loading.

The fundamental principles of using rock reinforcement to stabilize rock around excavations are described. Elements of rock reinforcement and accessories discussed include: rock bolts, rock dowels, wire mesh, rock bolt ties, and shotcrete. The 3 types of rock bolts commonly used are: (1) slot and wedge, (2) expansion, and (3) grouted. For a permanent rock bolt installation, the entire length of the bolt should be grouted. Rock bolts cause a compression zone in the rock around the excavation, a lateral expansion of the compressed

rock which induces compressive forces perpendicular to the rock bolt direction, and restrain surface deformation. In the surface areas between adjacent rock bolts, tension zones may be susceptible to rock fallout unless the surface is properly treated. The ratio of bolt length to bolt spacing should be not less than 2. The relative stability or instability of the rock around an excavation can be most practicably determined by measuring the rock deformation with time. Rock reinforcement installation and rock surface treatment are discussed. Basic concepts of using rock reinforcement to create structural members in the rock are also reviewed. (USBR)
W73-06991

8F. Concrete

POLYMER CONCRETE STRUCTURAL ELEMENTS,
S. S. Davydov.
Materials and Structures, Testing and Research, Vol 5, No 26, p 99-104, Mar-Apr, 1972. 8 fig, 11 ref. (Translated from French, Bureau of Reclamation Translation 877, Sept., 1972).

Descriptors: *Construction materials, *Structural members, *Mechanical properties, Concrete technology, Polymers, Epoxy resins, Resins, Watertight, Strength, Durability, Materials engineering, Formulas.
Identifiers: *Limit analysis, Furan resins, Chemical resistance, USSR, Concrete-polymer materials, Polymer concretes, Polyester resins, Composite materials, Polymerization.

Soviet scientists have conducted extensive research and development of polymer concretes for use in a variety of structures. Reinforced polymer concretes are being used successfully as supports in mines, underground conduits, mine shafts, dam facings, supports for overhead trolley wires, gratings, and industrial buildings. Physical and mechanical properties of polymer concretes based on the following synthetic resins are discussed: (1) polyester, (2) epoxy, (3) phenol-formaldehyde, (4) carbamide, and (5) furan. A practical method is presented for determining strength and deformation of polymer concrete under sustained force, using diagrams of limiting conditions. Diagrams of the limiting conditions express the strength of polymer concretes in terms of temperature and time. With this method, the load carrying capacity of composite polymer concrete structural members can be evaluated. (USBR)
W73-06990

TOTAL INTERACTION METHOD FOR TORSION DESIGN,
Mullen and Powell, Inc., Dallas, Tex.
K. S. Rajagopalan, U. Behera, and P. M. Ferguson.
Journal of the Structural Division, American Society of Civil Engineers, Vol 98, No ST9, p 2097-2117, Sept., 1972. 5 fig, 6 tab, 7 ref, 2 append.

Descriptors: *Beams (Structural), *Reinforced concrete, *Structural engineering, Investigations, Shear strength, Reinforcement, Design standards, Evaluation, Theory, Tests.
Identifiers: *Torsion, American Concrete Inst, Combined loading, Bending, Stirrups, Ultimate strength design, Comparative studies, Flexural strength, Test results.

The total interaction method for designing reinforced concrete beams carrying flexural, shear, and torsional loads permits more flexibility in design choices than the 1971 ACI Code. Validity of the method is demonstrated by comparison with more than 200 test beams from several investigations. Numerical design examples and test data show that a given combination of shear-torque-moment in a specific beam size can be satisfied by quite different ratios of the longitudinal steel added for torsion to the total stirrup steel. Extra longitudinal steel is not a significant factor in resisting pure torsion, but is a major factor under the combined loading. This optional method offers possible economic advantages over the ACI Code method. Tests of 6 beams having unsymmetrical top and bottom longitudinal steel are also presented. Preliminary indication is that any strength loss with unsymmetrical steel is largely overcome by extending bars a distance d beyond the points of inflection. (USBR)
W73-06995

MODES OF FAILURE OF CONCRETE PANELS EXPOSED TO HIGH TEMPERATURES,
King's Coll, London (England).
J. W. Dougill.
Magazine of Concrete Research, Vol 24, No 17, p 71-76, June, 1972. 1 fig, 19 ref.

Descriptors: *Concrete technology, *Concrete tests, Bibliographies, Concretes, Temperature, Thermal properties, Thermal stress, Thermal expansion, Failure, Structural behavior, Concrete properties, Stress, Strain.
Identifiers: *Fire resistance, *High temperature research, Concrete deterioration, Great Britian, Compressive stress, Stress-strain curves, Failure surfaces, *Spalling, Strain softening.

Occurrence of a mode of general spalling may cause complete destruction of a concrete wall panel or floor slab shortly after the start of a fire test. Examples given suggest that this spalling may be a form of compression failure caused by strain softening--behavior commonly exhibited by concrete in a standard compression test. A method analyzing structural behavior of a plain concrete panel is formulated in general terms. The analysis: (1) demonstrates effects of strain softening, (2) suggests that 2 possible modes of instability cause compression failure, and (3) shows that instability is not possible under high axial and flexural restraint conditions. These conclusions are independent of the precise form of the stress-strain relationship and are primarily a direct consequence of a descending branch in the stress-strain curve of concrete in compression. (USBR)
W73-06997

AN APPARATUS FOR DETERMINING THE COEFFICIENT OF THERMAL EXPANSION OF ROCKS, MORTARS AND CONCRETES,
National Building Research Inst., Pretoria (South Africa).
For primary bibliographic entry see Field 08D.
W73-06998

BEHAVIOR OF ANCHORED BARS UNDER LOW CYCLE OVERLOADS PRODUCING INELASTIC STRAINS,
Brown and Root, Houston, Tex.
M. A. F. Ismail, and J. O. Jirsa.
Journal of the American Concrete Institute, Proceedings, Vol 69, No 7, p 433-438, July, 1972. 8 fig, 4 ref.

Descriptors: *Cantilevers, *Concrete technology, *Reinforced concrete, Beams (Structural), Deflection, Deformation, Reinforcing steel, Stress, Yield strength, Strain, Joints (Connections), Deterioration, Materials testing.
Identifiers: *Embedment depth, *Cyclic loads, Elongation, Beam colums, Bonding strength, Bond tests, Test results.

Behaviror of anchored bars supporting cantilever beams was studied. The bars simulated anchorage conditions at an exterior beam-column joint where the beam is subjected to large cyclic overloads well into the yield range of the reinforcement. Twenty specimens were tested to failure under monotonic, repeated, or reversed load cycles. Results indicated that under repeated or monotonic loads, stresses and elongations gradually increased with increasing end deflections. Elongations of the anchored bars contributed between 30 to 45% of the total end deflection of the beams. Under reversed load, stress distributions did not change significantly but elongations of the bars contributed up to 60% of the end deflection of the beam. Based on test results the response of anchored bars to cycles of large overload appears to depend upon both load history and beam geometry. To prevent failures in anchored bars subjected to cyclic overloads, as in structures subjected to seismic loadings, increasing the embedment length of the bars may be necessary. (USBR)
W73-06999

8G. Materials

SIGNIFICANCE OF GROUND-WATER CHEMISTRY IN PERFORMANCE OF NORTH SAHARA TUBE WELLS IN ALGERIA AND TUNISIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W73-06715

8I. Fisheries Engineering

SOME DATA ON THE BIOLOGY OF ZOPE IN THE TSIMLYANSK RESERVOIR AND ITS COMMERCIAL USE, (IN RUSSIAN),
G. M. Fesenko.
Tr Volgogr Otd Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 5: p 120-135. 1971.
Identifiers: Biology, Plankton, Reservoirs, *Tsimlyansk reservoir, USSR, *Zope, *Zooplankton.

The zope population in the reservoir was represented by 30 age groups. The average weight for all size groups in catches in 1966 varied from 21-843 g. Zope ate zooplankton and were distributed throughout the entire reservoir. The populations numbers were subjected to substantial variations.--Copyright 1972, Biological Abstracts, Inc.
W73-06502

PROPERTIES OF THE FORMATION OF ICHTYOFAUNA IN THE CHEREPOVETS (SHEKSNA) RESERVOIR (IN RUSSIAN),
L. K. Il'ina.
Tr Inst Biol Vnutr Vod Akad Nauk SSSR. 21. 24. p 203-211, 1971.
Identifiers: Bream, *Cherepovets Reservoir, Fauna, *Ichthyo fauna, Perch, Plankton, Reservoir, Roach, Stocks.

Due to unfavorable conditions at the time of filling and the lack of a meliorative work during the preparatory period, the Sheksna River portion of the reservoir was first populated with less valuable species--perch, roach, white bream and bleak. Pike perch and bream, the main commercial fish, were in the minority and their stocks were rejuvenated intensively. As the level increased, conditions in the White Lake degenerated. The bottom land which had formerly been drainage area in the summer was flooded and the inflow of organic substances into the lake was sharply reduced. With the increase in depth the effect of waves on the soil decreased, bringing into the water less of the nutrient substances which stimulate plankton development. Transparency of the lake water increased and its feeding qualities decreased.--Copyright 1972, Biological Abstracts, Inc.
W73-06899

DIET, DIETARY INTERRELATIONSHIPS OF FISH AND THE EFFECTIVENESS OF THEIR

USE OF FOOD RESOURCES IN NATURAL BODIES OF WATER IN BYELORUSSIAN POLES'YA. 3. DIET OF PIKE, (IN RUSSIAN),
V. P. Lyakhnovich, and T. I. Nekhaeva.
Vestn Belorussk Univ. 2. 2. p 34-37. 1971.
Identifiers: Bream, *Byelorussian, Polesya, Diet, Fish, Food, Perch, *Pike, Roach, USSR.

In the rivers and lakes of Polesya pike age 1-5 yr consume 11 spp. of fish. The basic diet consists of roach (40-50%), perch (30-40%), pike (20-30%), and white bream (up to 20%). The daily rations of pike decrease with age from 4 to 1.5% of body weight. The effectiveness of using food energy for growth in rivers is 15-23%, in lakes 20-27%. In rivers 5-8 kg of fish are used per kg of weight gain, in lakes 5-6 kg are used. --Copyright 1972, Biological Abstracts, Inc.
W73-06926

FOOD BASE AND FISH PRODUCTIVITY IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
N. S. Menyuk.
Rybn Khoz Resp Mezhved Temat Nauchn Sb. 3. p 128-132. 1971.
Identifiers: Biomass, Chironomid, Fish, Food, *KremenchugReservoir, Mollusk, Oligochaetes, Productivity, Reservoir, USSR, *Zoobenthos.

The food base for fish-benthophages in the Kremenchug Reservoir from 1966-69 was studied. The biomass of zoobenthos was given by season (spring, summer and autumn). The production of basic food resources (mollusks and total chironomid larvae and oligochaetes) was determined. The potential weight increase for ichthyofauna at the expense of available food (40% of mollusk production and 50% of 'soft' benthos production) was computed. Potential and actual catches of benthophagic fish in kg/ha were compared. --Copyright 1972, Biological Abstracts, Inc.
W73-06927

THE USE OF THE 'PUKAT SEPAT' IN THE HARVESTING OF 'IKAN SEPAT SIAM,' TRICHOGASTER PECTORALIS (ROGAN), IN THE PADDY-FIELDS OF NORTHERN KRIAN, PERAK,
T. S. Peng.
Malays Agric J. Vol 48, No 2, p 69-72. 1971. Illus.
Identifiers: Ikan-Sepat-Siam, Krian, *Malaysia, Paddy-M, Perak, *Pukat-Sepat, *Trichogaster-Pectoralis, Fish harvesting.

The method employed in the use of the 'pukat sepat,' a miniature gill net, in harvesting T. pectoralis (Regan) in a paddy field is described. The effectiveness of this net in catching paddy field fish, the factors affecting the catch size and the problems involved in estimating the total fish production per unit area of paddy field are discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-06937

DIET AND GROWTH OF GOLDFISH LARVAE IN A POND OF THE 'PUSHCHA-VODITSA' FISH BREEDING PROJECT (IN RUSSIAN),
V. D. Radzimovskii.
Rybn Khoz Resp Mezhved Temat Nauchn Sb. 13. p 105-112. 1971.
Identifiers: Breeding, Diet, Fish, *Goldfish, Growth, Larvae, Pond, *Pushcha-Voditsa, USSR.

Data on the growth and diet of goldfish at different stages of larval development during pond raising were gathered. The qualitative composition of the food and quantitative value of separate components were analyzed.--Copyright 1972, Biological Abstracts, Inc.
W73-06964

CONDITION OF THE STOCK AND SEASONAL CATCHES OF VOLGA PIKE PERCH IN THE TSIMLYANSK RESERVOIR (IN RUSSIAN),
V. M. Tyunyakov.
Tr Volgogr Otd Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 5: p 136-139. 1971.
Identifiers: *Pike, Perch, Reservoirs, Seasonal, Stock, *Tsimlyansk Reservoir, USSR, Volga.

The number of Volga pike perch in the reservoir began to increase in 1957. Catches of this fish in recent years equalled 26,300 centners. Catches were profitable in the III-IV quadrants.--Copyright 1972, Biological Abstracts, Inc.
W73-07023

PRELIMINARY EXPERIMENTS IN GROWING CARP IN RECIRCULATING WATER,
Fish Culture Research Station, Dor (Israel).
G. Wohlfarth, M. Lahman, and R. Moav.
Bamidgeh. Vol 23, No 4, p 103-116. 1971. Illus.
Identifiers: Asbestos, *Carp, Growing, Stocking, Tank, *Recirculating water.

A pilot plant for growing fish in recirculating water was constructed. The details of the plant, which contains 24 asbestos tanks each of 750 capacity, are described. Two preliminary experiments of growing carp fingerlings in this plant were conducted. The effects of the following variables on growth rate were tested: feeding rates, stocking rates, initial weights, and genetic differences. More frequent feeding (5 times a day) was better than less frequent feeding (twice a day), although the total daily ration was identical in the 2 regimes. The effect of stocking density on individual growth rate was not clear. Initial weight had a very strong effect on relative growth rate. No difference in growth rate was found among 3 tested stocks.--Copyright 1972, Biological Abstracts, Inc.
W73-07024

USE OF A NEW METHOD FOR MASSIVE TAGGING OF JUVENILES (IN RUSSIAN),
N. E. Sal'nikov, and T. V. Lugovaya.
Rybn Khoz Resp Mezhved Temat Nauchn Sb. 12. p 128-129. 1971.
Identifiers: *Carp, *Juveniles, Methodology, *Tagging.

A method for massive tagging of fish with water soluble cold dyes is suggested. It is preferred for its economy and speed. Fish tagged by subcutaneous injection are not traumatized. Wild carp juveniles caught 1 yr after tagging maintained the tag satisfactorily.--Copyright 1972, Biological Abstracts, Inc.
W73-07029

COMPOSITION OF SPAWNING STOCKS AND REPRODUCTION OF FISH IN THE VOLGA--AKHTUBINSK FLOODPLAIN, (IN RUSSIAN),
V. V. Delitsyn.
Tr Volgogr Otd Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 5: p 192-209. 1971.

Descriptors: Asp, Bream, Carp, Catfish, Fish, Floodplains, Ide, Perch, Pike, *Reproduction, Roach, *Spawning, Stocks, *Volga-Akhtubinsk floodplain.

Regulation of the Volga run-off at Volgograd changed the flood pattern in the Volga-Aktubinsk floodplain and the thermal regime. During the reproductive period for fish which spawn in the spring, the average 10-day water temperature in the Volga dropped by 1.5-2.5 deg. The effectiveness of breeding in the Volga-Aktubinsk floodplain was studied in 1965 and 1966, during which the hydrometeorological conditions differed. The pattern of water flow from the Volgograd Reservoir in the spring of 1966 was typical. A short characterization of the reproduction of pike, bream, catfish, wild carp, asp, roach, ide, white bream, zope and perch and the percentage composition of catches, age, dimensions, fecundity and distribution of juveniles for these fish is given. The breeding of wild carp, pike and pike perch was undermined. Other fish, even in unfavorable waters, had a chance to reproduce.--Copyright 1972, Biological Abstracts, Inc.
W73-07087

DIETARY CHARACTERISTICS OF CHAR (SALVELINUS ALPINUS (L.) IN LAKE AZABACHE, (IN RUSSIAN),
L. V. Kokhmenko.
Izv Tikhookean Nauchno-Issled Inst Rybn Khoz Okeanogr. 78: p 117-128. 1970. English summary.
Identifiers: *Char, Diets, *Lake Azabache, Mollusk, Salvelinus-Alpinus, Smelt, Stickleback, Sturgeon, USSR.

Lake-river char in Lake Azabache are divided by the nature of their diet into predators, benthophages and specimens with mixed nutrition (fish as the main food). Char-benthophages feed basically on mollusks; other benthonic organisms have a secondary role. Char-predators eat mainly stickleback and smelt. Sturgeon young comprise 7% of their diet by number and weight. In the Azabache River which flows from the lake, char eat sturgeon young for the most part at the mouth of the river. In the general food mass of the char, sturgeon young comprise 40 and 64.6% by number and weight, respectively. On the average 0.3 specimens of sturgeon young are consumed per stomach in the lake while 3.5 are consumed in the river.--Copyright 1972, Biological Abstracts, Inc.
W73-07096

09. MANPOWER, GRANTS AND FACILITIES

9D. Grants, Contracts, and Research Act Allotments

PROJECTS IN INDUSTRIAL POLLUTION CONTROL PROGRAM, JULY 1972,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 05G.
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A NATIONAL SYSTEM FOR EXCHANGE OF WATER DATA,
Geological Survey, Washington, D.C.
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A NATIONAL SYSTEM FOR EXCHANGE OF WATER DATA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-06832

10C. Secondary Publication And Distribution

PCB IN WATER - A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.

For primary bibliographic entry see Field 05A.
W73-06501

WATER RESOURCES INVENTORY,
Lake Porter County Regional Transportation and Planning Commission, Crown Point, Ind.
For primary bibliographic entry see Field 03D.
W73-06916

TECHNOLOGY ASSESSMENT OF WINTER OROGRAPHIC SNOWPACK AUGMENTATION IN THE UPPER COLORADO RIVER BASIN--THE IMPACTS OF SNOW ENHANCEMENT: VOLUME II: TECHNICAL REPORT,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 03B.
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NUTRIENT ENRICHMENT OF RUNOFF WATERS BY SOILS. PHASE I: PHOSPHORUS ENRICHMENT POTENTIAL OF URBAN SOILS IN THE CITY OF MADISON,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
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DESIGN OF WASTEWATER TREATMENT SYSTEMS TO SATISFY EFFLUENT QUALITY REQUIREMENTS BASED ON INTENDED USE,
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Ohio State Univ. Research Foundation, Columbus.
For primary bibliographic entry see Field 05G.
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A. Centers of Competence		
American Water Works Association Research Foundation, Water Treatment Plant Waste Pollution Control	W73-06595	1
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W73-06625 -- 06626 06628 -- 06630 06632 06637 -- 06643 06645 -- 06661 06663 -- 06670 06673 -- 06681 06929 06931 -- 06936 06938 -- 06944 07065 -- 07075 07078 -- 07085 07090 -- 07095 07099 -- 07100 07102 -- 07109	96
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Michigan Institute of Water Research	W73-06527	1
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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